

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

GASB Statement Nos. 67 and 68 Accounting and Financial
Reporting for Pension Plans

June 30, 2022





September 30, 2022

Retirement Board
Missouri Department of Transportation
and Highway Patrol Employees' Retirement System
1913 William Street
Jefferson City, Missouri 65109

Dear Board Members:

This report provides accounting and financial reporting information that is intended to comply with the Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68 for the Missouri Department of Transportation and Highway Patrol Employees' Retirement System ("MPERS"). These calculations have been made on a basis that is consistent with our understanding of these accounting standards.

GASB Statement No. 67 is the accounting standard that applies to the stand-alone financial reports issued by retirement systems. GASB Statement No. 68 establishes accounting and financial reporting for State and local government employers who provide their employees (including former employees) pension benefits through a trust.

Our calculation of the liability associated with the benefits described in this report was performed for the purpose of providing reporting and disclosure information that satisfies the requirements of GASB Statement Nos. 67 and 68. The calculation of the plan's liability for this report may not be applicable for funding purposes of the plan. A calculation of the plan's liability for purposes other than satisfying the requirements of GASB Statement No. 67 may produce significantly different results. This report may be provided to parties other than MPERS only in its entirety and only with the permission of the Retirement Board. GRS is not responsible for unauthorized use of this report.

This report is based upon information, furnished to us by Retirement System staff, concerning retirement and ancillary benefits, active members, deferred vested members, retirees and beneficiaries, and financial data. If your understanding of this information is different, please let us know. This information was checked for internal consistency, but it was not audited.

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.

To the best of our knowledge, this report is complete, accurate, and in accordance with generally recognized actuarial methods. Heidi G. Barry and Jamal Adora are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the Academy of Actuaries to render the actuarial opinions contained herein.

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

Respectfully submitted,
Gabriel, Roeder, Smith & Company



Heidi G. Barry, ASA, FCA, MAAA



Jamal Adora, ASA, EA, MAAA

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SECTION A



EXECUTIVE SUMMARY

Executive Summary as of June 30, 2022

Actuarial Valuation Date	June 30, 2022
Measurement Date of the Net Pension Liability	June 30, 2022
Employer's Fiscal Year Ending Date (Employer's Reporting Date)	June 30, 2023
Plan's Fiscal Year Ending Date (Plan's Reporting Date)	June 30, 2022

Membership

Number of		
- Retirees and Beneficiaries	9,426	
- Inactive, Nonretired Members	2,247	
- Active Members	6,874	
- Total	18,547	
Valuation Payroll	\$ 356,662,242	
Covered Payroll (Reported Fiscal Year Payroll Paid)	\$ 367,493,332	

Net Pension Liability

Total Pension Liability	\$ 4,410,685,047
Plan Fiduciary Net Position	3,067,193,086
Net Pension Liability	\$ 1,343,491,961
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	69.54%
Net Pension Liability as a Percentage of Covered Payroll	365.58%

Development of the Single Discount Rate

Single Discount Rate	6.50%
Long-Term Expected Rate of Investment Return	6.50%
Long-Term Municipal Bond Rate*	3.69%
Last year ending June 30 in the 2023 to 2122 projection period for which projected benefit payments are fully funded	2122

Total Pension Expense \$ 128,882,276

Deferred Outflows and Deferred Inflows of Resources by Source to be Recognized in Future Pension Expenses

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience	\$ 13,153,535	\$ 13,695,777
Changes in assumptions	117,092,033	-
Net difference between projected and actual earnings on pension plan investments	129,066,422	321,803,230
Total	\$ 259,311,990	\$ 335,499,007

**Source: Fixed-income municipal bonds with 20 years to maturity that include only federally tax-exempt municipal bonds as reported in Fidelity Index's "20-Year Municipal GO AA Index" as of June 30, 2022. In describing this index, Fidelity notes that the municipal curves are constructed using option-adjusted analytics of a diverse population of over 10,000 tax exempt securities.*



Discussion

Accounting Standard

For pension plans that are administered through trusts or equivalent arrangements, Governmental Accounting Standards Board (GASB) Statement No. 67 establishes standards of financial reporting for separately issued financial reports and specifies the required approach for measuring the pension liability. Similarly, GASB Statement No. 68 establishes standards for state and local government employers (as well as non-employer contributing entities) to account for and disclose the net pension liability, pension expense, and other information associated with providing retirement benefits to their employees (and former employees) on their basic financial statements.

The following discussion provides a summary of the information that is required to be disclosed under these accounting standards. A number of these disclosure items are provided in this report. However, certain information, such as notes regarding accounting policies and investments, is not included in this report and the retirement system and/or plan sponsor will be responsible for preparing and disclosing that information to comply with these accounting standards.

Financial Statements

GASB Statement No. 68 requires State or local governments to recognize the net pension liability and the pension expense on their financial statements. The net pension liability is the difference between the total pension liability and the plan's fiduciary net position. In traditional actuarial terms, this is analogous to the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

The pension expense recognized each fiscal year is equal to the change in the net pension liability from the beginning of the year to the end of the year, adjusted for deferred recognition of the liability and investment experience.

Pension plans that prepare their own, stand-alone financial statements are required to present two financial statements – a statement of fiduciary net position and a statement of changes in fiduciary net position in accordance with GASB Statement No. 67. The *statement of fiduciary net position* presents the assets and liabilities of the pension plan at the end of the pension plan's reporting period. The *statement of changes in fiduciary net position* presents the additions, such as contributions and investment income, and deductions, such as benefit payments and expenses, and net increase or decrease in the fiduciary net position.

Notes to Financial Statements

GASB Statement No. 68 requires the notes of the employer's financial statements to disclose the total pension expense, the pension plan's liabilities and assets, and deferred outflows and inflows of resources related to pensions.

Discussion

Both GASB Statements No. 67 and No. 68 require the notes of the financial statements for the employers and pension plans to include certain additional information. The list of disclosure items should include:

- A description of benefits provided by the plan;
- The type of employees and number of members covered by the pension plan;
- A description of the plan's funding policy, which includes member and employer contribution requirements;
- The pension plan's investment policies;
- The pension plan's fiduciary net position, net pension liability, and the pension plan's fiduciary net position as a percentage of the total pension liability;
- The net pension liability using a discount rate that is 1% higher and 1% lower than used to calculate the total pension liability and net pension liability for financial reporting purposes;
- Significant assumptions and methods used to calculate the total pension liability;
- Inputs to the discount rates; and
- Certain information about mortality assumptions and the dates of experience studies.

Retirement Systems that issue stand-alone financial statements are required to disclose additional information in accordance with GASB Statement No. 67. This information includes:

- The composition of the pension plan's Board and the authority under which benefit terms may be amended;
- A description of how fair value is determined; and
- Information regarding certain reserves and investments, which include concentrations of investments greater than or equal to 5%, receivables, and insurance contracts excluded from plan assets.

Required Supplementary Information

GASB Statement No. 67 requires a 10-year fiscal history of:

- Sources of changes in the net pension liability;
- Information about the components of the net pension liability and related ratios, including the pension plan's fiduciary net position as a percentage of the total pension liability, and the net pension liability as a percent of covered-employee payroll; and
- Comparison of the actual employer contributions to the actuarially determined contributions based on the plan's funding policy.

Timing of the Valuation

An actuarial valuation to determine the total pension liability is required to be performed at least every two years. The net pension liability and pension expense should be measured as of the pension plan's fiscal year end (measurement date) on a date that is within the employer's prior fiscal year. If the actuarial valuation used to determine the total pension liability is not calculated as of the measurement date, the Total Pension Liability (TPL) is required to be rolled forward from the actuarial valuation date to the measurement date.



Discussion

The total pension liability shown in this report is based on an actuarial valuation performed as of June 30, 2022 and a measurement date of June 30, 2022.

Measurement of the Net Pension Liability

The net pension liability is to be measured as the total pension liability, less the amount of the pension plan's fiduciary net position. In actuarial terms, this will be the accrued liability less the market value of assets (not the smoothed actuarial value of assets that is often encountered in actuarial valuations performed to determine the employer's contribution requirement).

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 13 years, based on the permanent funding policy;
- 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 of the valuation report.

Limitations of Assets as a Percent of Total Pension Liability Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the market 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).

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.



Discussion

Single Discount Rate

Projected benefit payments are required to be discounted to their actuarial present values using a single discount rate that reflects: 1) a long-term expected rate of return on pension plan investments (to the extent that the plan's fiduciary net position is projected to be sufficient to pay benefits); and 2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 6.50%; the municipal bond rate is 3.69% (based on the daily rate closest to but not later than the measurement date of the Fidelity 20-Year Municipal GO AA Index); and the resulting single discount rate is 6.50%.

Under the Board's current funding policy, the plan is expected to exceed a 100% funded status if future experience is exactly as assumed due to the Contribution Stabilization Reserve Fund that became part of the funding policy in 2014.

SECTION B



FINANCIAL STATEMENTS

Statement of Pension Expense under GASB Statement No. 68

Fiscal Year Ended June 30, 2022

A. Expense

1. Service Cost (inc. disability expense, service purchases, and transfers in)	\$ 55,097,433
2. Interest on the Total Pension Liability	275,067,181
3. Current-Period Benefit Changes	0
4. Member Contributions (inc. service purchases and transfers in)	(12,655,780)
5. Projected Earnings on Plan Investments (made negative for addition here)	(193,321,396)
6. Pension Plan Administrative Expense	5,229,018
7. Other Changes in Plan Fiduciary Net Position	0
8. Recognition of Outflow (Inflow) of Resources due to Liabilities	62,003,806
9. Recognition of Outflow (Inflow) of Resources due to Assets	<u>(62,537,986)</u>
10. Total Pension Expense	\$ 128,882,276



Statement of Outflows and Inflows Arising from Current Reporting Period Fiscal Year Ended June 30, 2022

A. Outflows (Inflows) of Resources Due to Liabilities

1. Difference between expected and actual experience of the Total Pension Liability (gains) or losses	\$	16,085,222
2. Assumption Changes (gains) or losses	\$	-
3. Recognition period for Liabilities: Average of the expected remaining service lives of all employees {in years}		4.0969
4. Outflow (Inflow) of Resources to be recognized in the current pension expense for the difference between expected and actual experience of the Total Pension Liability	\$	3,926,193
5. Outflow (Inflow) of Resources to be recognized in the current pension expense for Assumption Changes	\$	-
6. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Liabilities	\$	3,926,193
7. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for the difference between expected and actual experience of the Total Pension Liability	\$	12,159,029
8. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses for Assumption Changes	\$	-
9. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Liabilities	\$	12,159,029

B. Outflows (Inflows) of Resources Due to Assets

1. Net difference between projected and actual earnings on pension plan investments (gains) or losses	\$	70,553,716
2. Recognition period for Assets {in years}		5
3. Outflow (Inflow) of Resources to be recognized in the current pension expense due to Assets	\$	14,110,743
4. Deferred Outflow (Inflow) of Resources to be recognized in future pension expenses due to Assets	\$	56,442,973



Statement of Outflows and Inflows Arising from Current and Prior Reporting Periods Fiscal Year Ended June 30, 2022

A. Outflows and Inflows of Resources Due to Liabilities and Assets to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows of Resources
1. Due to Liabilities	\$ 71,554,710	\$ 9,550,904	\$ 62,003,806
2. Due to Assets	51,031,914	113,569,900	(62,537,986)
3. Total	\$ 122,586,624	\$ 123,120,804	\$ (534,180)

B. Outflows and Inflows of Resources by Source to be Recognized in Current Pension Expense

	Outflows of Resources	Inflows of Resources	Net Outflows of Resources
1. Differences between expected and actual experience	\$ 4,811,228	\$ 9,550,904	\$ (4,739,676)
2. Assumption Changes	66,743,482	-	66,743,482
3. Net Difference between projected and actual earnings on pension plan investments	51,031,914	113,569,900	(62,537,986)
4. Total	\$ 122,586,624	\$ 123,120,804	\$ (534,180)

C. Deferred Outflows and Deferred Inflows of Resources by Source to be Recognized in Future Pension Expenses

	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows of Resources
1. Differences between expected and actual experience	\$ 13,153,535	\$ 13,695,777	\$ (542,242)
2. Assumption Changes	117,092,033	-	117,092,033
3. Net Difference between projected and actual earnings on pension plan investments	129,066,422	321,803,230	(192,736,808)
4. Total	\$ 259,311,990	\$ 335,499,007	\$ (76,187,017)

D. Deferred Outflows and Deferred Inflows of Resources by Year to be Recognized in Future Pension Expenses

Year Ending June 30	Net Deferred Outflows of Resources
2023	\$ (3,237,429)
2024	(5,154,500)
2025	(82,286,282)
2026	14,491,194
2027	-
Thereafter	-
Total	\$ (76,187,017)



Statement of Outflows and Inflows Arising from Current and Prior Reporting Periods Fiscal Year Ended June 30, 2022

Year Established	Initial Amount	Initial Recognition Period	Current Year Recognition	Remaining Recognition	Remaining Recognition Period
Deferred Outflow (Inflow) Due to Differences between Expected and Actual Experience on Liabilities					
2018	\$ (37,173,164)	4.3720	\$ (3,162,948)	\$ -	0.0000
2019	203,459	4.2011	48,430	9,739	0.2011
2020	3,494,582	4.1771	836,605	984,767	1.1771
2021	(26,471,689)	4.1440	(6,387,956)	(13,695,777)	2.1440
2022	16,085,222	4.0969	3,926,193	12,159,029	3.0969
Total			\$ (4,739,676)	\$ (542,242)	
Deferred Outflow (Inflow) Due to Assumption Changes					
2018	\$ 142,556,109	4.3720	\$ 12,129,661	\$ -	0.0000
2019	-	4.2011	-	-	0.2011
2020	-	4.1771	-	-	1.1771
2021	226,319,675	4.1440	54,613,821	117,092,033	2.1440
2022	-	4.0969	-	-	3.0969
Total			\$ 66,743,482	\$ 117,092,033	
Deferred Outflow (Inflow) Due to Differences between Projected and Actual Earnings on Plan Investments					
2018	\$ (31,510,781)	5.0000	\$ (6,302,157)	\$ -	0.0000
2019	6,094,463	5.0000	1,218,893	1,218,891	1.0000
2020	178,511,392	5.0000	35,702,278	71,404,558	2.0000
2021	(536,338,716)	5.0000	(107,267,743)	(321,803,230)	3.0000
2022	70,553,716	5.0000	14,110,743	56,442,973	4.0000
Total			\$ (62,537,986)	\$ (192,736,808)	

According to paragraph 33 of GASB No. 68, differences between expected and actual experience and changes in assumptions are recognized in pension expense using a systematic and rational method over a closed period equal to the average of the expected remaining service lives of all employees that are provided with pensions through the pension plan (active employees and inactive employees) determined as of the beginning of the measurement period.

At the beginning of the current measurement period, the expected remaining service lives of all active employees in the plan was approximately 76,149 years. Additionally, the average total plan membership (active employees and inactive employees) was 18,587. As a result, the average of the expected remaining service lives for purposes of recognizing the applicable deferred outflows and inflows of resources established in the current measurement period is 4.0969 years.

Additionally, differences between projected and actual earnings on pension plan investments should be recognized in pension expense using a systematic and rational method over a closed five-year period. For this purpose, the deferred outflows and inflows of resources are recognized in the pension expense as a level dollar amount over the closed period identified above.



Statement of Fiduciary Net Position as of June 30, 2022

Assets	
Cash	\$ 1,063,596
Receivables	
Investment Sales	\$ 102,034,872
Accrued Investment Interest and Income	6,888,453
Contributions	9,381,543
Total Receivables	<u>\$ 118,304,868</u>
Investments	
Equities	\$ 110,372,581
Fixed Income	905,805,465
Limited Partnerships	1,699,581,097
Hedge	43,882,503
Short Term Securities	298,827,629
Total Investments	<u>\$ 3,058,469,275</u>
Securities Lending Collateral	\$ 23,800,467
Capital Assets	
Land (not depreciated)	\$ 188,319
Equipment	3,438,789
Building	581,618
Accumulated Depreciation	(3,819,811)
Total Capital Assets	<u>\$ 388,915</u>
Deferred Outflows - OPEB Related Items	<u>\$ 513,253</u>
Total Assets	<u><u>\$ 3,202,540,374</u></u>
Liabilities	
Investment Fees Payable	\$ 823,699
OPEB Obligation	2,367,620
Security Lending Collateral	24,560,325
Deferred Inflows - OPEB Related Items	115,751
Accounts Payable - Other	107,479,893
Total Liabilities	<u>\$ 135,347,288</u>
Net Position Restricted for Pensions	<u><u>\$ 3,067,193,086</u></u>



Statement of Changes in Fiduciary Net Position for Year Ended June 30, 2022

Additions

Contributions	
Employer	\$ 212,711,117
Employee (inc. service purchases and transfers in)	12,655,780
Total Contributions	\$ 225,366,897
Investment Income	
Total Net Appreciation and Gains	\$ 127,910,217
Total Interest and Dividends	58,448,601
Less Total Investment Expenses	(63,775,229)
Net Investment Income	\$ 122,583,589
Income from Securities Lending Activities	
Securities Lending Income	\$ 183,896
Less Total Securities Lending Expenses	-
Net Income from Securities Lending Activities	\$ 183,896
Other	\$ 195
Total Additions	\$ 348,134,577

Deductions

Benefit Payments (inc. refunds, disability premiums, and transfers out)	\$ 279,637,701
Administrative Expenses	5,229,018
Total Deductions	\$ 284,866,719
Net Increase in Net Position	\$ 63,267,858

Net Position Restricted for Pensions

Beginning of Year	\$ 3,003,925,228
Post Valuation Audit Adjustment	\$ -
End of Year	\$ 3,067,193,086



Schedule of Proportionate Employer Share for Year Ended June 30, 2022

Contributions#	Employer	Prop. Share	Deferred Outflows of Resources					Deferred Inflows of Resources					Pension Expense			
			Net Pension Liability	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments	Changes of Assum.	Changes in Proportion and Differences Between Employer Cont. and Share of Cont.	Total Deferred Outflows of Resources	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments	Changes in Proportion and Differences Between Employer Cont. and Share of Cont.	Total Deferred Inflows of Resources	Prop. Share of Plan Pension Expense	Contributions and Proportionate Share of Contributions	Total Employer Pension Expense	
\$ 130,476,819	MoDOT	61.74%	\$ 829,471,937	\$ 8,120,993	\$ 79,685,609	\$ 72,292,621	\$ 1,527,355	\$ 161,626,578	\$ 8,455,773	\$ 198,681,314	\$ -	\$ 7,294,332	\$ 214,431,419	\$ 79,571,917	\$ (1,941,365)	\$ 77,630,552
80,859,344	Highway Patrol	38.26%	514,020,024	5,032,542	49,380,813	44,799,412	7,294,332	106,507,099	5,240,004	123,121,916	-	1,527,355	129,889,275	49,310,359	1,941,365	51,251,724
\$ 211,336,163	Total for All Employers	100.0000%	\$1,343,491,961	\$ 13,153,535	\$ 129,066,422	\$117,092,033	\$ 8,821,687	\$ 268,133,677	\$ 13,695,777	\$321,803,230	\$ -	\$ 8,821,687	\$ 344,320,694	\$128,882,276	\$ -	\$128,882,276

Excludes \$1,374,954 in contributions for Retirement System members. Retirement System members' costs were spread proportionately to the other two employers.

Employer	Employer Allocation Percentage	Schedule of Deferred (Inflows)/Outflows							Total
		2023	2024	2025	2026	2027	Thereafter		
MoDOT	61.74%	\$ (4,359,412)	\$ (6,261,927)	\$ (51,144,589)	\$ 8,961,086	\$ -	\$ -	\$ (52,804,842)	
Highway Patrol	38.26%	1,121,983	1,107,427	(31,141,693)	5,530,108	-	-	(23,382,175)	
TOTAL	100.00%	\$ (3,237,429)	\$ (5,154,500)	\$ (82,286,282)	\$ 14,491,194	\$ -	\$ -	\$ (76,187,017)	



SECTION C

REQUIRED SUPPLEMENTARY INFORMATION

Schedule of Changes in Net Pension Liability and Related Ratios Current Period Fiscal Year Ended June 30, 2022

A. Total Pension Liability

1. Service Cost (inc. disab. exp., svc. purchases, and transfers in)	\$	55,097,433
2. Interest on the Total Pension Liability		275,067,181
3. Changes of Benefit Terms		-
4. Difference between Expected and Actual Experience of the Total Pension Liability		16,085,222
5. Changes of Assumptions		-
6. Benefit Payments (inc. refunds of employee contributions, disability premiums, and transfers out)		(279,637,701)
7. Other		-
8. Net change in Total Pension Liability	\$	66,612,135
9. Total Pension Liability – Beginning		4,344,072,912
10. Total Pension Liability – Ending	<u>\$</u>	<u>4,410,685,047</u>

B. Plan Fiduciary Net Position

1. Contributions – employer	\$	212,711,117
2. Contributions – employee (inc. svc. purchases, and transfers in)		12,655,780
3. Net Investment Income		122,767,680
4. Benefit Payments (inc. refunds of employee contributions, disability premiums, and transfers out)		(279,637,701)
5. Pension Plan Administrative Expense		(5,229,018)
6. Net Change in Plan Fiduciary Net Position	\$	63,267,858
7. Plan Fiduciary Net Position – Beginning		3,003,925,228
8. Post Valuation Audit Adjustment		-
9. Plan Fiduciary Net Position – Ending	<u>\$</u>	<u>3,067,193,086</u>

C. Net Pension Liability

\$ 1,343,491,961

D. Plan Fiduciary Net Position as a percentage of the Total Pension Liability

69.54%

E. Covered-Employee Payroll (Reported Fiscal Year Payroll Paid)

\$ 367,493,332

F. Net Pension Liability as a percentage of covered-employee payroll

365.58%

Valuation Payroll was \$356,662,242.



Schedules of Required Supplementary Information

Schedule of Changes in Net Pension Liability and Related Ratios (Multiyear)

Last 10 Fiscal Years

Fiscal year ending June 30,

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013*
Total Pension Liability										
Service Cost (starting with 2022, inc. disab. exp., svc. purchases, and transfers in)	\$ 55,097,433	\$ 43,726,886	\$ 44,048,083	\$ 43,971,030	\$ 46,621,377	\$ 45,713,403	\$ 45,441,305	\$ 45,358,095	\$ 44,739,603	\$ 44,446,279
Interest on the Total Pension Liability	275,067,181	278,522,994	274,791,358	271,174,089	286,457,436	283,568,441	280,432,068	275,284,910	270,525,608	265,339,848
Benefit Changes	-	-	-	-	(7,684)	-	-	-	-	-
Difference between Expected and Actual Experience	16,085,222	(26,471,689)	3,494,582	203,459	(37,173,164)	(37,286,966)	(39,810,009)	(13,324,219)	(17,614,321)	(13,690,794)
Assumption Changes	-	226,319,675	-	-	142,556,109	-	-	-	-	204,396,180
Benefit Payments (starting with 2022, inc. disability premiums and transfers out)	(278,612,715)	(266,108,191)	(262,710,812)	(255,310,406)	(254,131,209)	(246,617,775)	(236,488,629)	(236,905,323)	(227,958,108)	(220,623,394)
Refunds	(1,024,986)	(611,132)	(796,106)	(780,538)	(503,007)	(321,328)	(198,106)	(107,395)	(18,686)	(29,300)
Other (prior to 2022, disability premiums and transfers out)	-	(3,403,528)	(4,098,916)	(3,726,867)	(4,424,647)	(4,345,049)	(3,489,276)	(4,702,158)	(3,407,914)	(2,141,931)
Net Change in Total Pension Liability	66,612,135	251,975,015	54,728,189	55,530,767	179,395,211	40,710,726	45,887,353	65,603,910	66,266,182	277,696,888
Total Pension Liability - Beginning	4,344,072,912	4,092,097,897	4,037,369,708	3,981,838,941	3,802,443,730	3,761,733,004	3,715,845,651	3,650,241,741	3,583,975,559	3,306,278,671
Total Pension Liability - Ending (a)	\$4,410,685,047	\$4,344,072,912	\$4,092,097,897	\$4,037,369,708	\$3,981,838,941	\$ 3,802,443,730	\$ 3,761,733,004	\$ 3,715,845,651	\$ 3,650,241,741	\$ 3,583,975,559
Plan Fiduciary Net Position										
Contributions - Employer	\$ 212,711,117	\$ 208,212,848	\$ 210,871,852	\$ 210,166,927	\$ 204,955,180	\$ 206,562,924	\$ 199,609,396	\$ 200,638,571	\$ 183,353,841	\$ 170,836,117
Contributions - Member (starting with 2022, inc. svc. purchases, and transfers in)	12,655,780	7,095,963	6,547,351	5,996,344	5,001,418	4,891,932	3,482,513	3,294,162	2,260,563	1,139,450
Pension Plan Net Investment Income	122,767,680	699,644,536	(10,667,857)	154,326,818	197,619,838	220,301,741	21,432,095	92,645,571	319,445,780	198,141,088
Benefit Payments (starting with 2022, inc. disability premiums and transfers out)	(278,612,715)	(266,108,191)	(262,710,812)	(255,310,406)	(254,131,209)	(246,617,775)	(236,488,629)	(236,905,323)	(227,958,108)	(220,619,035)
Refunds	(1,024,986)	(611,132)	(796,106)	(780,538)	(503,007)	(321,328)	(198,106)	(107,395)	(18,686)	(29,300)
Pension Plan Administrative Expense	(5,229,018)	(4,585,473)	(4,291,028)	(4,372,966)	(4,693,492)	(4,515,458)	(4,370,860)	(4,066,944)	(3,736,355)	(2,997,225)
Other (prior to 2022, disability premiums and net transfers)	-	(1,323,211)	(615,342)	(1,294,497)	(2,557,202)	(2,600,942)	(759,597)	(3,587,721)	(1,623,532)	(2,141,931)
Net Change in Plan Fiduciary Net Position	63,267,858	642,325,340	(61,661,942)	108,731,682	145,691,526	177,701,094	(17,293,188)	51,910,921	271,723,503	144,329,164
Plan Fiduciary Net Position - Beginning	3,003,925,228	2,361,599,888	2,423,261,830	2,314,530,148	2,169,775,040	1,992,073,946	2,009,367,134	1,957,456,213	1,685,732,710	1,541,403,546
Post Valuation Audit Adjustment	-	-	-	-	(936,418)	-	-	-	-	-
Plan Fiduciary Net Position - Ending (b)	\$3,067,193,086	\$3,003,925,228	\$2,361,599,888	\$2,423,261,830	\$2,314,530,148	\$ 2,169,775,040	\$ 1,992,073,946	\$ 2,009,367,134	\$ 1,957,456,213	\$ 1,685,732,710
Net Pension Liability - Ending (a) - (b)	1,343,491,961	1,340,147,684	1,730,498,009	1,614,107,878	1,667,308,793	1,632,668,690	1,769,659,058	1,706,478,517	1,692,785,528	1,898,242,849
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	69.54 %	69.15 %	57.71 %	60.02 %	58.13 %	57.06 %	52.96 %	54.08 %	53.63 %	47.04 %
Covered-Employee Payroll	\$ 367,493,332	\$ 359,409,940	\$ 363,980,262	\$ 362,747,630	\$ 353,751,292	\$ 356,515,416	\$ 344,635,441	\$ 342,264,593	\$ 336,590,797	\$ 323,205,767
Net Pension Liability as a Percentage of Covered-Employee Payroll	365.58 %	372.87 %	475.44 %	444.97 %	471.32 %	457.95 %	513.49 %	498.58 %	502.92 %	587.32 %
Notes to Schedule:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* After post- "June 30, 2013 valuation" adjustments.



Schedules of Required Supplementary Information

Schedule of the Net Pension Liability (Multiyear)

Last 10 Fiscal Years

FY Ending June 30,	Total Pension Liability	Plan Net Position	Net Pension Liability	Plan Net Position as a % of Total Pension Liability	Covered Payroll	Net Pension Liability as a % of Covered Payroll
2013	\$ 3,583,975,559	\$ 1,681,869,871	\$ 1,902,105,688	46.93%	\$ 323,205,767	588.51%
2014	3,650,241,741	1,957,456,213	1,692,785,528	53.63%	336,590,797	502.92%
2015	3,715,845,651	2,009,367,134	1,706,478,517	54.08%	342,264,593	498.58%
2016	3,761,733,004	1,992,073,946	1,769,659,058	52.96%	344,635,441	513.49%
2017	3,802,443,730	2,169,775,040	1,632,668,690	57.06%	356,515,416	457.95%
2018	3,981,838,941	2,314,530,148	1,667,308,793	58.13%	353,751,292	471.32%
2019	4,037,369,708	2,423,261,830	1,614,107,878	60.02%	362,747,630	444.97%
2020	4,092,097,897	2,361,599,888	1,730,498,009	57.71%	363,980,262	475.44%
2021	4,344,072,912	3,003,925,228	1,340,147,684	69.15%	359,409,940	372.87%
2022	4,410,685,047	3,067,193,086	1,343,491,961	69.54%	367,493,332	365.58%



Schedule of Contributions (Multiyear)

Last 10 Fiscal Years

FY Ending June 30,	Actuarially Determined Contribution	Actual Contribution	Contribution Deficiency (Excess)	Covered Payroll *	Actual Contribution as a % of Covered Payroll
2013	\$ 170,836,117	\$ 170,836,117	-	\$ 329,863,134	51.79%
2014	183,353,841	183,353,841	-	336,799,855	54.44%
2015	200,638,571	200,638,571	-	342,211,446	58.63%
2016	199,609,396	199,609,396	-	344,154,131	58.00%
2017	206,562,924	206,562,924	-	356,142,972	58.00%
2018	204,955,180	204,955,180	-	353,371,000	58.00%
2019	210,166,927	210,166,927	-	362,356,771	58.00%
2020	210,871,852	210,871,852	-	363,572,159	58.00%
2021	208,212,848	208,212,848	-	358,987,669	58.00%
2022	212,711,117	212,711,117	-	366,743,305	58.00%

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



Notes to Schedule of Contributions

Valuation Date: June 30, 2020
Notes Actuarially determined contribution rates are calculated as of June 30, for the fiscal year ending 2 years thereafter.

Methods and Assumptions Used to Determine FY 2022 Contribution Rates:

Actuarial Cost Method	Entry-Age
Amortization Method	Level Percentage of Payroll, Closed #
Remaining Amortization Period	Permanent Policy: The total contribution will be based on normal cost plus a 15-year amortization of UAAL. The amortization period is a closed 15-year period starting July 1, 2021. Temporary Accelerated Policy: The total contribution is based on normal cost plus a 4-year amortization period for unfunded retiree liabilities and a 19-year amortization period for other unfunded liabilities. Both amortization periods are closed periods starting July 1, 2021. This temporary accelerated policy was adopted by the Retirement Board on September 17, 2009 and will remain in effect until such time as the retiree liability becomes 100% funded or the permanent policy produces a higher contribution rate.
Asset Valuation Method	3-Year smoothed market; 20% corridor
Inflation	2.25% (price inflation)
Salary Increases	3.00% to 12.45% (including 3.00% wage inflation)
Investment Rate of Return	7.00%
Retirement Age	Experience-based table of rates that are specific to the type of eligibility condition. Last updated for the 2018 valuation pursuant to an experience study of the period July 1, 2013 - June 30, 2017.
Mortality	The mortality tables, for post-retirement mortality, used in evaluating allowances to be paid to non-disabled pensioners were the RP-2014 Healthy Annuitant Mortality Tables projected forward to 2022 using projection scales MP-2017. Pre-retirement mortality used was RP-2014 Employee Mortality Tables projected to 2022 using projection scales MP-2017 multiplied by a factor of 65%. Post-retirement disabled mortality used was the RP-2014 Disabled Retiree Annuitant Mortality Table projected to 2022 using projection scales MP-2017. All mortality tables include a margin for mortality improvement in the projection to 2022.

Other Information:

Notes There were no benefit changes during the year.

A Contribution Stabilization Reserve Fund of approximately \$143.9 million was added to the unfunded for purposes of determining the FY 2022 contribution rate.



SECTION D

NOTES TO FINANCIAL STATEMENTS

Single Discount Rate

A single discount rate of 6.50% was used to measure the total pension liability. This single discount rate was based on the expected rate of return on pension plan investments of 6.50%. The projection of cash flows used to determine this single discount rate assumed that plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the difference between actuarially determined contribution rates and the member rate. Based on these assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Regarding the sensitivity of the net pension liability to changes in the single discount rate, the following presents the plan's net pension liability, calculated using a single discount rate of 6.50%, as well as what the plan's net pension liability would be if it were calculated using a single discount rate that is 1-percentage-point lower or 1-percentage-point higher:

Sensitivity of Net Pension Liability to the Single Discount Rate Assumption

	Current Single Discount		
	1% Decrease	Rate Assumption	1% Increase
	5.50%	6.50%	7.50%
Total Pension Liability	\$ 4,935,765,618	\$ 4,410,685,047	\$ 3,973,570,515
Plan Fiduciary Net Position	3,067,193,086	3,067,193,086	3,067,193,086
Net Pension Liability	\$ 1,868,572,532	\$ 1,343,491,961	\$ 906,377,429

The inclusion of discount rates in the schedule above is not an indication of the reasonableness of the discount rate as an assumption.



Reconciliation of DROP Accounts

Disclosure Regarding the Contribution Stabilization Reserve Fund

At the September 26, 2014 Board meeting, the Board adopted the use of a Contribution Stabilization Reserve Fund that would result in an MPERS employer contribution rate similar to the Fiscal Year 2015 rates. The Contribution Stabilization Reserve Fund is intended to keep the contribution relatively level over time and may be used if the market experiences a downturn in the future. The Board further adopted (in February 2015) that the employer contribution rate would not fall below 58% unless 1) the fund became fully funded, or 2) the Contribution Stabilization Reserve Fund reached \$250 million. The balance of the Contribution Stabilization Reserve Fund as of June 30, 2022 is \$170,663,656.

Disclosure Regarding the Deferred Retirement Option Program

MPERS currently provides a BackDROP option. This is an election made at the time of actual retirement. In effect, it provides members an option to elect to receive a portion of their benefits as cash. Since the election is not made until the member actually retires, the option is not treated as a DROP provision as defined in GASB Statement No. 67.

Summary of Population Statistics

Inactive Plan Members or Beneficiaries Currently Receiving Benefits	9,426
Inactive Plan Members Entitled to But Not Yet Receiving Benefits	2,247
Active Plan Members	<u>6,874</u>
Total Plan Members	18,547

SECTION E

SUMMARY OF BENEFITS

Missouri Department of Transportation and Highway Patrol Employees' Retirement System Summary of Benefit Provisions Evaluated as of June 30, 2022

Closed Plan	Year 2000 Plan	2011 Tier
<p>Participation</p> <p>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.</p>	<p>Participation</p> <p>Participants include:</p> <ol style="list-style-type: none"> 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. 	<p>Participation</p> <p>Participants include:</p> <ol style="list-style-type: none"> 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)**

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).*

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.

**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).

*See Chapter 104.010.1(32) RSMo.

**Normal Retirement Eligibility
(unreduced benefit)**

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.

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.

**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). 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).

**Normal Retirement Eligibility
(unreduced benefit)**

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 5 years of creditable service.
2. Mandatory retirement at age 60.

**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).



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.

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.

Normal Retirement Benefit Amount

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.

Early Retirement (reduced benefit)

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.

Normal Retirement Benefit Amount

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)

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****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.

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.

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.

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. Normal retirement eligibility begins at age 62.

Minimum Base Benefit

Same.

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 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.

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 normal retirement considering years of creditable service. Normal retirement eligibility begins at age 67.

Minimum Base Benefit

Same.

Death Prior to Retirement

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

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.

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.

Death After Retirement

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

Same.

Death After Retirement

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

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.

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.

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.

\$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 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.

Police Service: Not available.

\$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: 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.

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.

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.

Portability: Same as Closed Plan Section 105.691.

Public Employment Prior Service (Subsidized Purchase)

Not available.

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.

Portability: Same as Closed Plan Section 105.691.

Public Employment Prior Service (Subsidized Purchase)

Not available.

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.



Closed Plan**Year 2000 Plan****2011 Tier****Post-Retirement Benefit Adjustments**

For active and inactive employees hired prior to August 28, 1997 and current retirees, 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%.

Member Contributions

None.

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%.

Member Contributions

None.

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

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 & 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 twelve-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.

SECTION F

ACTUARIAL COST METHOD AND ACTUARIAL ASSUMPTIONS

Summary of Valuation Method and Assumptions

June 30, 2022

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, 2018 actuarial valuation, following a five-year actuarial investigation covering the period July 1, 2012 through June 30, 2017. The valuation interest rate was updated after a review preceding the 2021 valuation. They 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.

Economic Assumptions

The 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 translates 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 32. 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, 2022 (Concluded)

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 RP-2014 Healthy Annuitant Mortality Tables projected to 2022 using projection scale MP-2017, shown on page 33.

Post-Retirement Disabled Mortality Rates. The rates currently in use for disabled lives are from the RP-2014 Disabled Retiree Annuitant Mortality Tables projected to 2022 using projection scale MP-2017, shown on page 34.

Pre-Retirement Mortality Rates. The rates currently in use for active lives are the RP-2014 Employee Mortality Table projected to 2022 using projection scale MP-2017 and multiplied by a factor of 65%, shown on page 35.

The probabilities of age and service retirement are shown on page 37. 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 38.

The probabilities of withdrawal from service are shown on page 39.

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

Present assets (cash & investments) were used at market value.

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	9.45%	6.80%
2	5.00%	4.50%
3	2.75%	2.80%
4	2.50%	1.50%
5	2.00%	1.00%
6	1.50%	0.80%
7	1.25%	0.00%
8	1.25%	0.00%
9	1.00%	0.00%
10	0.75%	0.00%
11	0.75%	0.00%
12	0.75%	0.00%
13	0.50%	0.00%
14	0.50%	0.00%
15	0.25%	0.00%
16	0.25%	0.00%
17	0.25%	0.00%
18	0.25%	0.00%
19	0.25%	0.00%
20	0.25%	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

Retired Lives Mortality Rates

Age	% Dying Next Year		Age	% Dying Next Year		Age	% Dying Next Year	
	Male	Female		Male	Female		Male	Female
20	0.0369%	0.0174%	60	0.7938%	0.5667%	100	31.3381%	28.0166%
21	0.0408%	0.0195%	61	0.8547%	0.6147%	101	33.3774%	30.0266%
22	0.0449%	0.0223%	62	0.9205%	0.6657%	102	35.3995%	32.0621%
23	0.0492%	0.0256%	63	0.9918%	0.7196%	103	37.3951%	34.0941%
24	0.0538%	0.0295%	64	1.0684%	0.7773%	104	39.3487%	36.0900%
25	0.0588%	0.0340%	65	1.1511%	0.8398%	105	41.2343%	38.0614%
26	0.0641%	0.0388%	66	1.2408%	0.9085%	106	43.0470%	39.9941%
27	0.0700%	0.0441%	67	1.3387%	0.9850%	107	44.7813%	41.8213%
28	0.0764%	0.0499%	68	1.4472%	1.0710%	108	46.4200%	43.5827%
29	0.0836%	0.0567%	69	1.5680%	1.1678%	109	47.9720%	45.2475%
30	0.0916%	0.0644%	70	1.7034%	1.2770%	110	49.4044%	46.8213%
31	0.1004%	0.0731%	71	1.8549%	1.4005%	111	49.9809%	48.2854%
32	0.1098%	0.0828%	72	2.0259%	1.5392%	112	49.9755%	49.6513%
33	0.1201%	0.0933%	73	2.2187%	1.6965%	113	49.9953%	50.2110%
34	0.1300%	0.1047%	74	2.4366%	1.8727%	114	49.9851%	50.0952%
35	0.1405%	0.1166%	75	2.6823%	2.0723%	115	50.0000%	50.0000%
36	0.1519%	0.1291%	76	2.9606%	2.2975%	116	50.0000%	50.0000%
37	0.1638%	0.1413%	77	3.2770%	2.5540%	117	50.0000%	50.0000%
38	0.1766%	0.1532%	78	3.6348%	2.8455%	118	50.0000%	50.0000%
39	0.1899%	0.1644%	79	4.0410%	3.1769%	119	50.0000%	50.0000%
40	0.2035%	0.1750%	80	4.5024%	3.5553%	120	100.0000%	100.0000%
41	0.2169%	0.1838%	81	5.0252%	3.9869%			
42	0.2307%	0.1918%	82	5.6159%	4.4782%			
43	0.2453%	0.1994%	83	6.2866%	5.0381%			
44	0.2609%	0.2070%	84	7.0474%	5.6722%			
45	0.2779%	0.2146%	85	7.9002%	6.3897%			
46	0.2964%	0.2231%	86	8.8634%	7.1988%			
47	0.3167%	0.2325%	87	9.9417%	8.1051%			
48	0.3394%	0.2424%	88	11.1427%	9.1109%			
49	0.3644%	0.2533%	89	12.4767%	10.2194%			
50	0.3922%	0.2660%	90	13.9500%	11.4522%			
51	0.4231%	0.2806%	91	15.4968%	12.7799%			
52	0.4563%	0.2986%	92	17.0856%	14.1857%			
53	0.4885%	0.3200%	93	18.6789%	15.6544%			
54	0.5223%	0.3449%	94	20.2575%	17.1685%			
55	0.5582%	0.3734%	95	21.8007%	18.7264%			
56	0.5971%	0.4054%	96	23.6045%	20.4458%			
57	0.6398%	0.4409%	97	25.4442%	22.2335%			
58	0.6865%	0.4797%	98	27.3578%	24.1013%			
59	0.7377%	0.5218%	99	29.3232%	26.0345%			



Post-Retirement Mortality (Disability)

Disabled Retired Lives Mortality Rates

Age	% Dying Next Year		Age	% Dying Next Year		Age	% Dying Next Year	
	Male	Female		Male	Female		Male	Female
20	0.0438%	0.0203%	60	2.7176%	1.8560%	100	32.6085%	28.7749%
21	0.0612%	0.0284%	61	2.8283%	1.9166%	101	34.2769%	30.5690%
22	0.0856%	0.0397%	62	2.9435%	1.9759%	102	35.9695%	32.4095%
23	0.1168%	0.0547%	63	3.0631%	2.0367%	103	37.6945%	34.2784%
24	0.1553%	0.0728%	64	3.1849%	2.1023%	104	39.4530%	36.1549%
25	0.2005%	0.0940%	65	3.3118%	2.1768%	105	41.2343%	38.0614%
26	0.2533%	0.1174%	66	3.4447%	2.2633%	106	43.0470%	39.9941%
27	0.3130%	0.1436%	67	3.5855%	2.3662%	107	44.7813%	41.8213%
28	0.3801%	0.1725%	68	3.7399%	2.4882%	108	46.4200%	43.5827%
29	0.4543%	0.2051%	69	3.9098%	2.6317%	109	47.9720%	45.2475%
30	0.5358%	0.2419%	70	4.0984%	2.7988%	110	49.4044%	46.8213%
31	0.6235%	0.2828%	71	4.3081%	2.9925%	111	49.9809%	48.2854%
32	0.7158%	0.3281%	72	4.5436%	3.2128%	112	49.9755%	49.6513%
33	0.8114%	0.3776%	73	4.8065%	3.4648%	113	49.9953%	50.2110%
34	0.9026%	0.4306%	74	5.1008%	3.7463%	114	49.9851%	50.0952%
35	0.9943%	0.4864%	75	5.4281%	4.0624%	115	50.0000%	50.0000%
36	1.0858%	0.5436%	76	5.7929%	4.4139%	116	50.0000%	50.0000%
37	1.1751%	0.6006%	77	6.2011%	4.8052%	117	50.0000%	50.0000%
38	1.2617%	0.6557%	78	6.6529%	5.2368%	118	50.0000%	50.0000%
39	1.3443%	0.7078%	79	7.1550%	5.7097%	119	50.0000%	50.0000%
40	1.4204%	0.7560%	80	7.7133%	6.2278%	120	100.0000%	100.0000%
41	1.4852%	0.7965%	81	8.3320%	6.7925%			
42	1.5449%	0.8333%	82	9.0153%	7.4046%			
43	1.6000%	0.8677%	83	9.7759%	8.0682%			
44	1.6518%	0.9006%	84	10.6221%	8.7816%			
45	1.7022%	0.9338%	85	11.5504%	9.5490%			
46	1.7528%	0.9691%	86	12.5809%	10.3728%			
47	1.8036%	1.0081%	87	13.7130%	11.2504%			
48	1.8561%	1.0486%	88	14.9503%	12.1767%			
49	1.9108%	1.0931%	89	16.2983%	13.1470%			
50	1.9679%	1.1445%	90	17.7578%	14.1809%			
51	2.0285%	1.2025%	91	19.1980%	15.3068%			
52	2.0949%	1.2677%	92	20.6246%	16.5148%			
53	2.1519%	1.3387%	93	22.0177%	17.7919%			
54	2.2110%	1.4144%	94	23.3675%	19.1177%			
55	2.2745%	1.4929%	95	24.6544%	20.4885%			
56	2.3451%	1.5721%	96	26.2066%	22.0265%			
57	2.4253%	1.6494%	97	27.7603%	23.6241%			
58	2.5146%	1.7227%	98	29.3541%	25.2910%			
59	2.6124%	1.7921%	99	30.9669%	27.0120%			



Pre-Retirement Mortality

Death-in-Service Mortality Rates

Age	% Dying Next Year		Age	% Dying Next Year		Age	% Dying Next Year	
	Male	Female		Male	Female		Male	Female
20	0.0239%	0.0106%	60	0.3113%	0.1733%	100	20.3698%	18.2108%
21	0.0268%	0.0108%	61	0.3515%	0.1870%	101	21.6953%	19.5173%
22	0.0295%	0.0109%	62	0.3965%	0.2013%	102	23.0097%	20.8404%
23	0.0313%	0.0112%	63	0.4467%	0.2166%	103	24.3068%	22.1612%
24	0.0324%	0.0116%	64	0.5019%	0.2329%	104	25.5767%	23.4585%
25	0.0309%	0.0119%	65	0.5624%	0.2506%	105	26.8023%	24.7399%
26	0.0302%	0.0122%	66	0.6210%	0.2753%	106	27.9806%	25.9962%
27	0.0300%	0.0127%	67	0.6844%	0.3028%	107	29.1078%	27.1838%
28	0.0303%	0.0133%	68	0.7539%	0.3335%	108	30.1730%	28.3288%
29	0.0311%	0.0140%	69	0.8303%	0.3680%	109	31.1818%	29.4109%
30	0.0322%	0.0150%	70	0.9147%	0.4070%	110	32.1129%	30.4338%
31	0.0337%	0.0161%	71	1.0083%	0.4510%	111	32.4876%	31.3855%
32	0.0352%	0.0174%	72	1.1130%	0.5006%	112	32.4841%	32.2733%
33	0.0368%	0.0187%	73	1.2299%	0.5572%	113	32.4969%	32.6372%
34	0.0382%	0.0200%	74	1.3608%	0.6207%	114	32.4903%	32.5619%
35	0.0393%	0.0214%	75	1.5071%	0.6928%	115	32.5000%	32.5000%
36	0.0402%	0.0227%	76	1.6706%	0.7741%	116	32.5000%	32.5000%
37	0.0412%	0.0242%	77	1.8540%	0.8664%	117	32.5000%	32.5000%
38	0.0423%	0.0258%	78	2.0582%	0.9704%	118	32.5000%	32.5000%
39	0.0437%	0.0276%	79	2.2859%	1.0874%	119	32.5000%	32.5000%
40	0.0456%	0.0296%	80	2.5398%	1.2190%	120	100.0000%	100.0000%
41	0.0478%	0.0317%	81	2.8770%	1.4450%			
42	0.0506%	0.0340%	82	3.2941%	1.7633%			
43	0.0543%	0.0367%	83	3.7903%	2.1715%			
44	0.0588%	0.0398%	84	4.3640%	2.6658%			
45	0.0640%	0.0434%	85	5.0073%	3.2435%			
46	0.0705%	0.0474%	86	5.7229%	3.9007%			
47	0.0777%	0.0521%	87	6.5034%	4.6310%			
48	0.0860%	0.0571%	88	7.3429%	5.4253%			
49	0.0954%	0.0626%	89	8.2360%	6.2734%			
50	0.1058%	0.0688%	90	9.1736%	7.1761%			
51	0.1174%	0.0757%	91	10.1429%	8.1223%			
52	0.1305%	0.0835%	92	11.1417%	9.1047%			
53	0.1442%	0.0922%	93	12.1542%	10.1144%			
54	0.1594%	0.1017%	94	13.1696%	11.1381%			
55	0.1764%	0.1121%	95	14.1705%	12.1722%			
56	0.1960%	0.1233%	96	15.3429%	13.2898%			
57	0.2187%	0.1351%	97	16.5387%	14.4518%			
58	0.2452%	0.1474%	98	17.7826%	15.6658%			
59	0.2759%	0.1602%	99	19.0601%	16.9224%			



Joint Life Retirement Values (6.50% Interest)

Sample Attained Ages	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	\$157.18	\$162.18	0.3922%	0.2660%	32.36	34.85
55	148.88	154.45	0.5582%	0.3734%	28.05	30.34
60	138.85	144.94	0.7938%	0.5667%	23.89	25.97
65	126.89	133.47	1.1511%	0.8398%	19.90	21.76
70	112.78	119.67	1.7034%	1.2770%	16.11	17.74
75	96.54	103.58	2.6823%	2.0723%	12.58	13.97
80	78.84	85.72	4.5024%	3.5553%	9.41	10.56

The present values shown above are for illustrative purposes only and include a 50% survivor benefit but do not include the value of future post-retirement increases. Males are assumed to be 3 years older than their spouses.

Rates of Retirement

Age	% of Active Participants Retiring								
	Closed and Year 2000 Plans					2011 Tier			
	Non-Uniformed Members				Uniformed	Non-Uniformed			Uniformed
	Male		Female			Normal		Early	
	Normal	Early	Normal	Early	Normal	Age & Service	Rule of 90		Normal
50	40%		25%		45%				
51	30%		20%		15%				
52	26%		20%		15%				
53	26%		20%		16%				
54	24%		24%		16%				
55	27%	3%	32%	3%	25%		30%		30%
56	25%	3%	35%	3%	30%		30%		30%
57	26%	4%	29%	4%	20%		30%		30%
58	22%	2%	25%	4%	30%		30%		30%
59	25%	4%	30%	5%	40%		30%		30%
60	19%	5%	22%	5%	100%		30%		100%
61	18%	5%	22%	5%	100%		30%		100%
62	40%	40%	36%	30%	100%		30%	10%	100%
63	35%	35%	22%	30%	100%		30%	10%	100%
64	25%	30%	20%	25%	100%		30%	10%	100%
65	35%		35%		100%		30%	10%	100%
66	40%		45%		100%		30%	10%	100%
67	45%		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%	0.10%	0.10%
31	0.10%	0.10%	0.10%	0.10%
32	0.10%	0.10%	0.11%	0.11%
33	0.10%	0.10%	0.11%	0.11%
34	0.10%	0.10%	0.12%	0.12%
35	0.10%	0.10%	0.13%	0.13%
36	0.10%	0.10%	0.13%	0.13%
37	0.10%	0.10%	0.14%	0.14%
38	0.10%	0.10%	0.14%	0.14%
39	0.10%	0.10%	0.15%	0.15%
40	0.10%	0.10%	0.17%	0.17%
41	0.10%	0.10%	0.19%	0.19%
42	0.10%	0.10%	0.21%	0.21%
43	0.10%	0.10%	0.23%	0.23%
44	0.10%	0.10%	0.24%	0.24%
45	0.10%	0.10%	0.27%	0.27%
46	0.10%	0.10%	0.30%	0.30%
47	0.10%	0.10%	0.32%	0.32%
48	0.10%	0.10%	0.36%	0.36%
49	0.10%	0.10%	0.41%	0.41%
50	0.10%	0.10%	0.46%	0.46%
51	0.10%	0.10%	0.52%	0.52%
52	0.10%	0.10%	0.59%	0.59%
53	0.10%	0.10%	0.68%	0.68%
54	0.10%	0.10%	0.77%	0.77%
55	0.10%	0.10%	0.86%	0.86%
56	0.10%	0.10%	0.97%	0.97%
57	0.10%	0.10%	1.09%	1.09%
58	0.10%	0.10%	1.22%	1.22%
59	0.10%	0.10%	1.35%	1.35%
60	0.10%	0.10%	1.49%	1.49%
61	0.10%	0.10%	1.64%	1.64%
62	0.10%	0.10%	1.80%	1.80%
63	0.10%	0.10%	1.97%	1.97%
64	0.10%	0.10%	2.15%	2.15%
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	12.00%	12.00%	30.00%	20.00%
	1-2	6.00%	6.00%	16.00%	14.00%
	2-3	2.50%	2.50%	9.00%	11.00%
	3-4	2.50%	2.50%	7.00%	9.00%
	4-5	2.50%	2.50%	5.50%	6.00%
25	5 & Up	1.89%	1.89%	5.60%	6.00%
26		1.89%	1.89%	5.60%	6.00%
27		1.89%	1.89%	5.60%	6.00%
28		1.89%	1.89%	5.60%	6.00%
29		1.89%	1.89%	5.60%	6.00%
30		1.89%	1.89%	5.60%	6.00%
31		1.89%	1.89%	5.53%	6.00%
32		1.83%	1.83%	5.46%	6.00%
33		1.65%	1.65%	5.39%	6.00%
34		1.49%	1.49%	5.32%	6.00%
35		1.34%	1.34%	5.25%	6.00%
36		1.19%	1.19%	5.18%	6.00%
37		1.06%	1.06%	5.11%	6.00%
38		0.95%	0.95%	5.04%	6.00%
39		0.86%	0.86%	4.97%	5.78%
40		0.79%	0.79%	4.90%	5.54%
41		0.74%	0.74%	4.48%	5.29%
42		0.69%	0.69%	4.06%	5.05%
43		0.64%	0.64%	3.64%	4.81%
44		0.60%	0.60%	3.22%	4.56%
45		0.55%	0.55%	2.80%	4.32%
46		0.50%	0.50%	2.66%	4.12%
47		0.46%	0.46%	2.52%	3.92%
48		0.41%	0.41%	2.38%	3.72%
49		0.36%	0.36%	2.24%	3.36%
50		0.32%	0.32%	2.10%	3.00%
51		0.27%	0.27%	1.96%	3.00%
52		0.23%	0.23%	1.82%	3.00%
53		0.21%	0.21%	1.68%	3.00%
54		0.19%	0.19%	1.54%	3.00%
55		0.16%	0.16%	1.40%	3.00%
56		0.17%	0.17%	1.40%	3.00%
57		0.13%	0.13%	1.40%	3.00%
58		0.13%	0.13%	1.40%	3.00%
59		0.13%	0.13%	1.40%	3.00%
60		0.12%	0.12%	1.40%	3.00%

Miscellaneous and Technical Assumptions

Administrative Expenses:	1.38% 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 for the Closed and Year 2000 plans were increased by 3.75% for Uniformed and 2.6% 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 for the 2011 Tier plan were increased by 1.5% for Uniformed and 1.0% for Non-Uniformed to account for the inclusion of unused sick leave in the calculation of Average Pay. Post disability benefit liabilities were increased by 50% 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 (Concluded)

Miscellaneous Adjustments:	Liabilities for future deferred members were increased by 2% 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.
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 nine 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: Five Terminated Vested members were indicated to have a refund request in progress and one was indicated to have a service transfer to LAGERS 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 of the valuation report) 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 40 and 41.

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.

Actuarial Accrued Liabilities, less pension assets as of June 30, 2022, resulted in **Unfunded Actuarial Accrued Liabilities (UAAL)**. The UAAL plus the CSR was amortized using the following funding policy.

Permanent Policy: The total contribution will be based on normal cost plus a 13-year amortization of unfunded actuarial accrued liabilities. The amortization period is a closed 13-year period starting July 1, 2023.

Temporary Accelerated Policy: The total contribution is based on normal cost plus a 2-year amortization period for unfunded retiree liabilities and a 17-year amortization period for other unfunded liabilities. Both amortization periods are closed periods starting July 1, 2023.

This temporary accelerated policy was adopted by the Retirement Board on September 17, 2009 and will remain in effect until such time as the retiree liability becomes 100% funded or the permanent policy produces a higher contribution rate.

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



SECTION G

CALCULATION OF THE SINGLE DISCOUNT RATE

Calculation of the Single Discount Rate

GASB Statement No. 67 includes a specific requirement for the discount rate that is used for the purpose of the measurement of the Total Pension Liability. This rate considers the ability of the fund to meet benefit obligations in the future. To make this determination, employer contributions, employee contributions, benefit payments, expenses and investment returns are projected into the future. The Plan Net Position (assets) in future years can then be determined and compared to its obligation to make benefit payments in those years. As long as assets are projected to be on hand in a future year, the assumed valuation discount rate is used. In years where assets are not projected to be sufficient to meet benefit payments, the use of a “risk-free” rate is required, as described in the following paragraph.

The Single Discount Rate (SDR) is equivalent to applying these two rates to the benefits that are projected to be paid during the different time periods. The SDR reflects: (1) the long-term expected rate of return on pension plan investments (during the period in which the fiduciary net position is projected to be sufficient to pay benefits); and (2) tax-exempt municipal bond rate based on an index of 20-year general obligation bonds with an average AA credit rating as of the measurement date (to the extent that the contributions for use with the long-term expected rate of return are not met).

For the purpose of this valuation, the expected rate of return on pension plan investments is 6.50%; the municipal bond rate is 3.69%; and the resulting single discount rate is 6.50%.

The tables in this section provide background for the development of the single discount rate.

The **Projection of Contributions** table shows the development of expected contributions in future years. Normal Cost contributions for future hires are not included (nor are their liabilities).

The **Projection of Plan Fiduciary Net Position** table shows the development of expected asset levels in future years.

The **Present Values of Projected Benefit Payments** table shows the development of the SDR. It breaks down the benefit payments into present values for funded and unfunded portions and shows the equivalent total at the SDR.

The tables shown on pages 44 through 46 show the projected contributions on behalf of the current members. This contribution is based on the current funding policy. The amortization of UAL is similar to the amortization schedule shown in the June 30, 2022 valuation report and includes the effects of the \$170,663,656 Contribution Stabilization Reserve Fund. However, the schedule was adjusted for the use of market value of assets instead of actuarial value of assets and to allow the Contribution Stabilization Reserve Fund to grow until reaching \$250 million. Once the maximum Contribution Stabilization Reserve Fund was reached, contributions were reduced, but not below \$0.

The tables shown on pages 47 and 48 show that the present value of projected unfunded benefit payments using the municipal bond rate is \$0. Therefore, we used the market rate of assumed investment return for all periods in the valuation.

The Projected Total Contributions shown are based on a closed group projection and are therefore not applicable for funding purposes of the open group.



Single Discount Rate Development

Projection of Contributions Ending June 30, 2072

Year	Valuation Payroll for Current Employees	Contributions from Current Employees	Service Cost and Expense Contributions	UAL Contributions	Total Contributions
0	\$ 356,662,242				
1	353,323,296	\$ 5,902,309	\$ 43,714,748	\$ 154,449,804	\$ 204,066,860
2	333,285,716	5,712,086	40,922,311	158,830,042	205,464,439
3	315,216,043	5,592,353	38,295,974	163,594,943	207,483,270
4	297,884,191	5,495,997	35,711,462	114,834,785	156,042,244
5	281,479,679	5,405,413	33,262,412	118,279,829	156,947,654
6	265,656,223	5,316,717	30,924,695	121,828,224	158,069,636
7	250,359,503	5,228,341	28,700,493	125,483,071	159,411,905
8	235,681,126	5,140,723	26,593,183	129,247,563	160,981,470
9	221,838,179	5,058,905	24,639,094	133,124,990	162,822,990
10	208,607,732	4,979,089	22,796,245	137,118,739	164,894,073
11	195,955,577	4,899,955	21,049,088	141,232,301	167,181,345
12	183,974,217	4,822,313	19,415,514	145,469,271	169,707,097
13	172,639,366	4,743,074	17,886,531	149,833,349	172,462,954
14	162,305,610	4,667,082	16,506,872	154,328,349	175,502,303
15	152,666,217	4,592,349	15,223,934	158,958,199	178,774,482
16	143,620,542	4,518,203	14,019,906	163,726,945	182,265,054
17	135,256,664	4,442,879	12,906,136	108,527,681	125,876,697
18	127,733,270	4,361,514	11,915,590	-	16,277,104
19	121,045,036	4,272,247	11,053,468	-	15,325,715
20	114,782,647	4,168,172	10,268,900	-	14,437,071
21	108,676,084	4,038,648	9,538,733	-	13,577,381
22	102,395,955	3,875,232	8,828,934	-	12,704,166
23	95,686,186	3,673,957	8,109,915	-	11,783,871
24	88,610,056	3,442,196	7,382,900	-	10,825,097
25	81,284,279	3,186,278	6,668,672	-	9,854,949
26	73,355,673	2,895,029	5,929,764	-	8,824,793
27	65,028,473	2,578,059	5,181,948	-	7,760,007
28	56,696,362	2,253,035	4,460,632	-	6,713,667
29	48,402,885	1,926,493	3,760,950	-	5,687,443
30	40,358,347	1,608,113	3,100,193	-	4,708,307
31	32,588,116	1,299,605	2,467,579	-	3,767,184
32	25,388,012	1,013,099	1,885,753	-	2,898,851
33	19,042,201	760,215	1,380,599	-	2,140,814
34	13,619,785	543,921	959,006	-	1,502,927
35	9,395,698	375,335	639,112	-	1,014,447
36	6,313,520	252,277	410,104	-	662,381
37	4,079,546	163,047	249,010	-	412,057
38	2,567,710	102,644	143,900	-	246,544
39	1,629,318	65,145	83,461	-	148,606
40	1,067,914	42,706	51,433	-	94,139
41	721,918	28,874	34,583	-	63,457
42	478,770	19,150	22,543	-	41,693
43	308,741	12,350	14,161	-	26,511
44	190,144	7,606	8,442	-	16,047
45	116,869	4,675	4,972	-	9,647
46	70,158	2,806	2,978	-	5,785
47	37,116	1,485	1,434	-	2,919
48	18,074	723	712	-	1,435
49	8,379	335	338	-	673
50	3,815	153	133	-	285



Single Discount Rate Development

Projection of Plan Fiduciary Net Position Ending June 30, 2122

Year	Projected					
	Projected Beginning Plan Net Position	Projected Total Contributions	Projected Benefit Payments	Administrative Expenses	Projected Investment Earnings at 6.50%	Projected Ending Plan Net Position
	(a)	(b)	(c)	(d)	(e)	(f)=(a)+(b)-(c)-(d)+(e)
1	\$ 3,067,193,086	\$ 204,066,860	\$ 273,503,956	\$ 4,875,861	\$ 196,990,400	\$ 3,189,870,529
2	3,189,870,529	205,464,439	279,670,574	4,599,343	204,820,725	3,315,885,776
3	3,315,885,776	207,483,270	288,231,562	4,349,981	212,810,420	3,443,597,923
4	3,443,597,923	156,042,244	296,613,978	4,110,802	219,205,706	3,518,121,093
5	3,518,121,093	156,947,654	304,555,331	3,884,420	223,831,885	3,590,460,881
6	3,590,460,881	158,069,636	312,133,151	3,666,056	228,334,445	3,661,065,756
7	3,661,065,756	159,411,905	319,292,069	3,454,961	232,744,449	3,730,475,080
8	3,730,475,080	160,981,470	325,787,809	3,252,400	237,104,955	3,799,521,295
9	3,799,521,295	162,822,990	331,787,837	3,061,367	241,466,046	3,868,961,126
10	3,868,961,126	164,894,073	337,807,134	2,878,787	245,859,178	3,939,028,456
11	3,939,028,456	167,181,345	343,136,748	2,704,187	250,321,820	4,010,690,687
12	4,010,690,687	169,707,097	348,398,950	2,538,844	254,897,620	4,084,357,610
13	4,084,357,610	172,462,954	351,907,457	2,382,423	259,666,897	4,162,197,581
14	4,162,197,581	175,502,303	354,595,330	2,239,817	264,742,300	4,245,607,038
15	4,245,607,038	178,774,482	356,362,354	2,106,794	270,216,318	4,336,128,689
16	4,336,128,689	182,265,054	357,169,020	1,981,963	276,190,072	4,435,432,832
17	4,435,432,832	125,876,697	357,096,565	1,866,542	280,847,079	4,483,193,501
18	4,483,193,501	16,277,104	355,277,714	1,762,719	280,507,113	4,422,937,286
19	4,422,937,286	15,325,715	352,821,621	1,670,422	276,641,545	4,360,412,502
20	4,360,412,502	14,437,071	348,906,486	1,584,001	272,677,011	4,297,036,097
21	4,297,036,097	13,577,381	344,332,795	1,499,730	268,679,045	4,233,459,998
22	4,233,459,998	12,704,166	339,785,541	1,413,064	264,666,898	4,169,632,457
23	4,169,632,457	11,783,871	335,618,753	1,320,469	260,624,919	4,105,102,026
24	4,105,102,026	10,825,097	331,776,979	1,222,819	256,525,787	4,039,453,112
25	4,039,453,112	9,854,949	327,797,623	1,121,723	252,358,102	3,972,746,817
26	3,972,746,817	8,824,793	324,246,979	1,012,308	248,106,319	3,904,418,641
27	3,904,418,641	7,760,007	320,250,742	897,393	243,762,436	3,834,792,949
28	3,834,792,949	6,713,667	316,331,683	782,410	239,332,337	3,763,724,861
29	3,763,724,861	5,687,443	312,118,941	667,960	234,818,504	3,691,443,906
30	3,691,443,906	4,708,307	307,651,031	556,945	230,235,394	3,618,179,631
31	3,618,179,631	3,767,184	302,788,115	449,716	225,602,098	3,544,311,082
32	3,544,311,082	2,898,851	297,208,809	350,355	220,954,517	3,470,605,286
33	3,470,605,286	2,140,814	290,437,269	262,782	216,358,803	3,398,404,852
34	3,398,404,852	1,502,927	282,740,156	187,953	211,893,982	3,328,873,651
35	3,328,873,651	1,014,447	273,885,089	129,661	207,643,952	3,263,517,300
36	3,263,517,300	662,381	263,890,030	87,127	203,705,613	3,203,908,137
37	3,203,908,137	412,057	253,339,094	56,298	200,161,504	3,151,086,306
38	3,151,086,306	246,544	242,366,800	35,434	197,074,444	3,106,005,060
39	3,106,005,060	148,606	231,028,186	22,485	194,504,148	3,069,607,142
40	3,069,607,142	94,139	219,634,066	14,737	192,501,268	3,042,553,747
41	3,042,553,747	63,457	208,508,694	9,962	191,097,851	3,025,196,398
42	3,025,196,398	41,693	197,521,459	6,607	190,320,498	3,018,030,523
43	3,018,030,523	26,511	186,588,099	4,261	190,204,046	3,021,668,720
44	3,021,668,720	16,047	175,860,017	2,624	190,783,421	3,036,605,547
45	3,036,605,547	9,647	165,316,771	1,613	192,091,403	3,063,388,214
46	3,063,388,214	5,785	154,913,566	968	194,164,955	3,102,644,420
47	3,102,644,420	2,919	144,723,875	512	197,042,483	3,154,965,435
48	3,154,965,435	1,435	134,865,756	249	200,758,655	3,220,859,520
49	3,220,859,520	673	125,346,880	116	205,346,244	3,300,859,441
50	3,300,859,441	285	116,167,056	53	210,839,876	3,395,532,493



Single Discount Rate Development

Projection of Plan Fiduciary Net Position Ending June 30, 2122 (Concluded)

Year	Projected Beginning Plan Net Position	Projected Total Contributions	Projected Benefit Payments	Projected Administrative Expenses	Projected Investment Earnings at 6.50%	Projected Ending Plan Net Position
51	\$ 3,395,532,493	\$ 101	\$ 107,391,024	\$ 18	\$ 217,274,351	\$ 3,505,415,902
52	3,505,415,902	3	99,020,019	1	224,684,544	3,631,080,430
53	3,631,080,430	-	91,048,208	-	233,107,744	3,773,139,966
54	3,773,139,966	-	83,466,162	-	242,584,151	3,932,257,955
55	3,932,257,955	-	76,260,955	-	253,157,303	4,109,154,303
56	4,109,154,303	-	69,419,071	-	264,874,427	4,304,609,659
57	4,304,609,659	-	62,927,848	-	277,786,668	4,519,468,479
58	4,519,468,479	-	56,776,634	-	291,949,259	4,754,641,104
59	4,754,641,104	-	50,957,460	-	307,421,626	5,011,105,270
60	5,011,105,270	-	45,464,921	-	324,267,494	5,289,907,843
61	5,289,907,843	-	40,296,272	-	342,554,998	5,592,166,568
62	5,592,166,568	-	35,451,788	-	362,356,782	5,919,071,562
63	5,919,071,562	-	30,934,360	-	383,750,112	6,271,887,314
64	6,271,887,314	-	26,748,920	-	406,817,021	6,651,955,416
65	6,651,955,416	-	22,901,503	-	431,644,520	7,060,698,433
66	7,060,698,433	-	19,397,635	-	458,324,899	7,499,625,697
67	7,499,625,697	-	16,240,439	-	486,956,165	7,970,341,422
68	7,970,341,422	-	13,429,134	-	517,642,616	8,474,554,904
69	8,474,554,904	-	10,958,296	-	550,495,531	9,014,092,139
70	9,014,092,139	-	8,817,268	-	585,633,939	9,590,908,809
71	9,590,908,809	-	6,990,087	-	623,185,471	10,207,104,193
72	10,207,104,193	-	5,455,895	-	663,287,247	10,864,935,546
73	10,864,935,546	-	4,189,475	-	706,086,796	11,566,832,868
74	11,566,832,868	-	3,162,420	-	751,742,976	12,315,413,423
75	12,315,413,423	-	2,344,768	-	800,426,867	13,113,495,522
76	13,113,495,522	-	1,706,401	-	852,322,624	13,964,111,746
77	13,964,111,746	-	1,218,096	-	907,628,299	14,870,521,949
78	14,870,521,949	-	852,428	-	966,556,659	15,836,226,179
79	15,836,226,179	-	584,567	-	1,029,336,002	16,864,977,615
80	16,864,977,615	-	392,771	-	1,096,210,981	17,960,795,825
81	17,960,795,825	-	258,593	-	1,167,443,457	19,127,980,689
82	19,127,980,689	-	166,901	-	1,243,313,406	20,371,127,194
83	20,371,127,194	-	105,693	-	1,324,119,887	21,695,141,387
84	21,695,141,387	-	65,763	-	1,410,182,086	23,105,257,710
85	23,105,257,710	-	40,286	-	1,501,840,462	24,607,057,886
86	24,607,057,886	-	24,364	-	1,599,457,983	26,206,491,505
87	26,206,491,505	-	14,595	-	1,703,421,481	27,909,898,392
88	27,909,898,392	-	8,694	-	1,814,143,117	29,724,032,815
89	29,724,032,815	-	5,172	-	1,932,061,968	31,656,089,610
90	31,656,089,610	-	3,083	-	2,057,645,726	33,713,732,253
91	33,713,732,253	-	1,845	-	2,191,392,537	35,905,122,946
92	35,905,122,946	-	1,108	-	2,333,832,956	38,238,954,793
93	38,238,954,793	-	667	-	2,485,532,040	40,724,486,167
94	40,724,486,167	-	400	-	2,647,091,588	43,371,577,354
95	43,371,577,354	-	239	-	2,819,152,520	46,190,729,636
96	46,190,729,636	-	140	-	3,002,397,422	49,193,126,918
97	49,193,126,918	-	81	-	3,197,553,247	52,390,680,084
98	52,390,680,084	-	46	-	3,405,394,204	55,796,074,242
99	55,796,074,242	-	25	-	3,626,744,825	59,422,819,041
100	59,422,819,041	-	14	-	3,862,483,237	63,285,302,265



Single Discount Rate Development

Present Values of Projected Benefits Ending June 30, 2122

Year	Projected Beginning Plan Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v^(a)-.5	(g)=(e)*vf^(a)-.5	(h)=(c)/(1+sdr)^(a)-.5
1	\$ 3,067,193,086	\$ 273,503,956	\$ 273,503,956	\$ -	\$ 265,026,199	\$ -	\$ 265,026,199
2	3,189,870,529	279,670,574	279,670,574	-	254,461,664	-	254,461,664
3	3,315,885,776	288,231,562	288,231,562	-	246,245,054	-	246,245,054
4	3,443,597,923	296,613,978	296,613,978	-	237,940,290	-	237,940,290
5	3,518,121,093	304,555,331	304,555,331	-	229,399,766	-	229,399,766
6	3,590,460,881	312,133,151	312,133,151	-	220,758,306	-	220,758,306
7	3,661,065,756	319,292,069	319,292,069	-	212,038,967	-	212,038,967
8	3,730,475,080	325,787,809	325,787,809	-	203,148,103	-	203,148,103
9	3,799,521,295	331,787,837	331,787,837	-	194,262,420	-	194,262,420
10	3,868,961,126	337,807,134	337,807,134	-	185,715,240	-	185,715,240
11	3,939,028,456	343,136,748	343,136,748	-	177,131,724	-	177,131,724
12	4,010,690,687	348,398,950	348,398,950	-	168,871,495	-	168,871,495
13	4,084,357,610	351,907,457	351,907,457	-	160,161,590	-	160,161,590
14	4,162,197,581	354,595,330	354,595,330	-	151,535,123	-	151,535,123
15	4,245,607,038	356,362,354	356,362,354	-	142,995,545	-	142,995,545
16	4,336,128,689	357,169,020	357,169,020	-	134,572,048	-	134,572,048
17	4,435,432,832	357,096,565	357,096,565	-	126,333,097	-	126,333,097
18	4,483,193,501	355,277,714	355,277,714	-	118,018,429	-	118,018,429
19	4,422,937,286	352,821,621	352,821,621	-	110,049,341	-	110,049,341
20	4,360,412,502	348,906,486	348,906,486	-	102,186,069	-	102,186,069
21	4,297,036,097	344,332,795	344,332,795	-	94,691,594	-	94,691,594
22	4,233,459,998	339,785,541	339,785,541	-	87,738,121	-	87,738,121
23	4,169,632,457	335,618,753	335,618,753	-	81,372,947	-	81,372,947
24	4,105,102,026	331,776,979	331,776,979	-	75,531,910	-	75,531,910
25	4,039,453,112	327,797,623	327,797,623	-	70,071,338	-	70,071,338
26	3,972,746,817	324,246,979	324,246,979	-	65,082,007	-	65,082,007
27	3,904,418,641	320,250,742	320,250,742	-	60,356,707	-	60,356,707
28	3,834,792,949	316,331,683	316,331,683	-	55,979,431	-	55,979,431
29	3,763,724,861	312,118,941	312,118,941	-	51,862,841	-	51,862,841
30	3,691,443,906	307,651,031	307,651,031	-	48,000,410	-	48,000,410
31	3,618,179,631	302,788,115	302,788,115	-	44,358,391	-	44,358,391
32	3,544,311,082	297,208,809	297,208,809	-	40,883,591	-	40,883,591
33	3,470,605,286	290,437,269	290,437,269	-	37,513,717	-	37,513,717
34	3,398,404,852	282,740,156	282,740,156	-	34,290,643	-	34,290,643
35	3,328,873,651	273,885,089	273,885,089	-	31,189,393	-	31,189,393
36	3,263,517,300	263,890,030	263,890,030	-	28,217,069	-	28,217,069
37	3,203,908,137	253,339,094	253,339,094	-	25,435,573	-	25,435,573
38	3,151,086,306	242,366,800	242,366,800	-	22,848,771	-	22,848,771
39	3,106,005,060	231,028,186	231,028,186	-	20,450,554	-	20,450,554
40	3,069,607,142	219,634,066	219,634,066	-	18,255,351	-	18,255,351
41	3,042,553,747	208,508,694	208,508,694	-	16,272,904	-	16,272,904
42	3,025,196,398	197,521,459	197,521,459	-	14,474,566	-	14,474,566
43	3,018,030,523	186,588,099	186,588,099	-	12,838,835	-	12,838,835
44	3,021,668,720	175,860,017	175,860,017	-	11,362,115	-	11,362,115
45	3,036,605,547	165,316,771	165,316,771	-	10,029,040	-	10,029,040
46	3,063,388,214	154,913,566	154,913,566	-	8,824,341	-	8,824,341
47	3,102,644,420	144,723,875	144,723,875	-	7,740,757	-	7,740,757
48	3,154,965,435	134,865,756	134,865,756	-	6,773,222	-	6,773,222
49	3,220,859,520	125,346,880	125,346,880	-	5,910,954	-	5,910,954
50	3,300,859,441	116,167,056	116,167,056	-	5,143,721	-	5,143,721

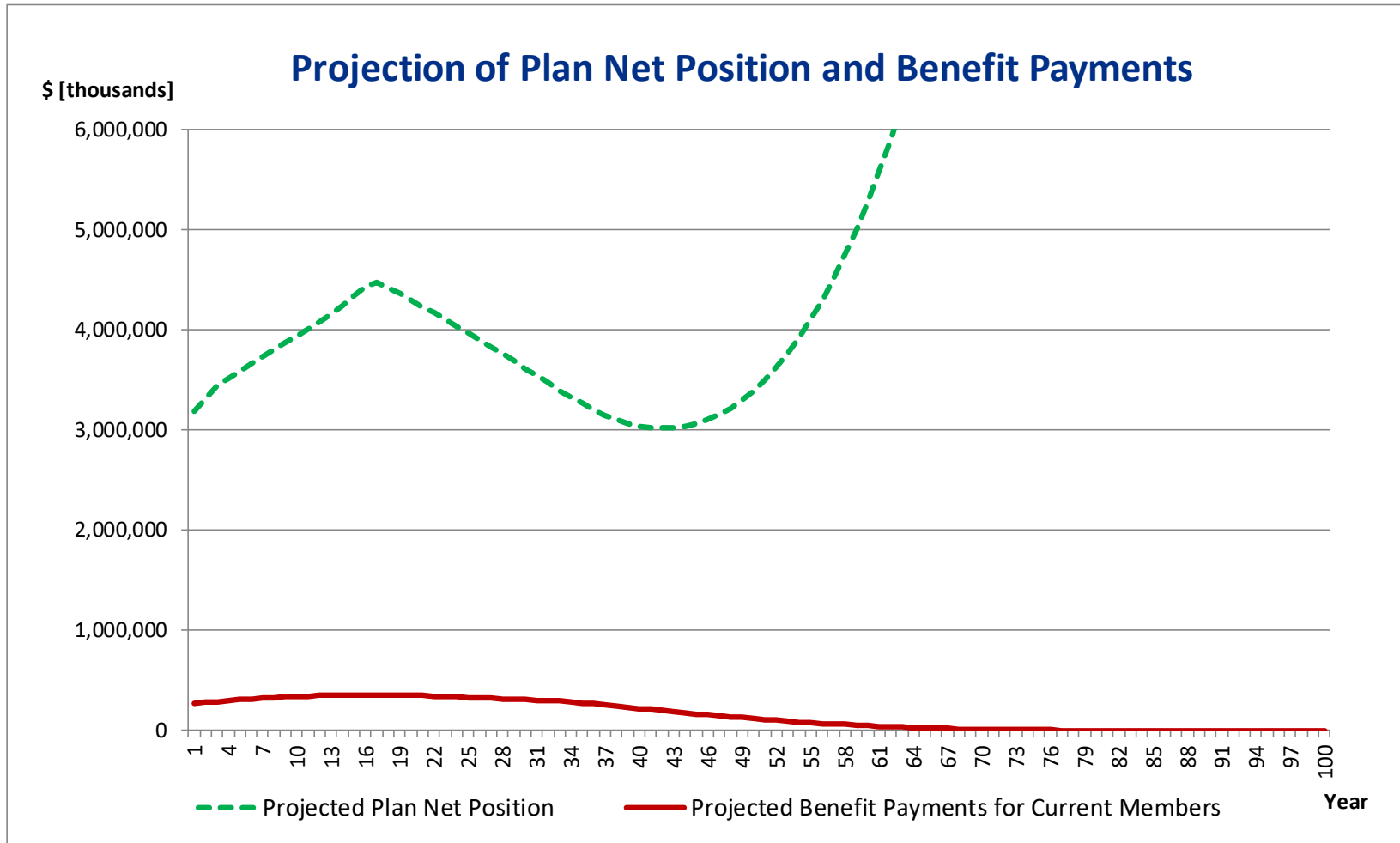


Single Discount Rate Development

Present Values of Projected Benefits Ending June 30, 2122 (Concluded)

Year	Projected Beginning Plan Net Position	Projected Benefit Payments	Funded Portion of Benefit Payments	Unfunded Portion of Benefit Payments	Present Value of Funded Benefit Payments using Expected Return Rate (v)	Present Value of Unfunded Benefit Payments using Municipal Bond Rate (vf)	Present Value of Benefit Payments using Single Discount Rate (sdr)
					(f)=(d)*v ^{-(a)-.5}	(g)=(e)*vf ^{-(a)-.5}	(h)=(c)/(1+sdr) ^{-(a)-.5}
(a)	(b)	(c)	(d)	(e)	(f)=(d)*v ^{-(a)-.5}	(g)=(e)*vf ^{-(a)-.5}	(h)=(c)/(1+sdr) ^{-(a)-.5}
51	\$ 3,395,532,493	\$ 107,391,024	\$ 107,391,024	\$ -	\$ 4,464,911	\$ -	\$ 4,464,911
52	3,505,415,902	99,020,019	99,020,019	-	3,865,611	-	3,865,611
53	3,631,080,430	91,048,208	91,048,208	-	3,337,467	-	3,337,467
54	3,773,139,966	83,466,162	83,466,162	-	2,872,807	-	2,872,807
55	3,932,257,955	76,260,955	76,260,955	-	2,464,612	-	2,464,612
56	4,109,154,303	69,419,071	69,419,071	-	2,106,568	-	2,106,568
57	4,304,609,659	62,927,848	62,927,848	-	1,793,040	-	1,793,040
58	4,519,468,479	56,776,634	56,776,634	-	1,519,033	-	1,519,033
59	4,754,641,104	50,957,460	50,957,460	-	1,280,135	-	1,280,135
60	5,011,105,270	45,464,921	45,464,921	-	1,072,444	-	1,072,444
61	5,289,907,843	40,296,272	40,296,272	-	892,511	-	892,511
62	5,592,166,568	35,451,788	35,451,788	-	737,288	-	737,288
63	5,919,071,562	30,934,360	30,934,360	-	604,075	-	604,075
64	6,271,887,314	26,748,920	26,748,920	-	490,463	-	490,463
65	6,651,955,416	22,901,503	22,901,503	-	394,289	-	394,289
66	7,060,698,433	19,397,635	19,397,635	-	313,581	-	313,581
67	7,499,625,697	16,240,439	16,240,439	-	246,518	-	246,518
68	7,970,341,422	13,429,134	13,429,134	-	191,403	-	191,403
69	8,474,554,904	10,958,296	10,958,296	-	146,654	-	146,654
70	9,014,092,139	8,817,268	8,817,268	-	110,799	-	110,799
71	9,590,908,809	6,990,087	6,990,087	-	82,477	-	82,477
72	10,207,104,193	5,455,895	5,455,895	-	60,446	-	60,446
73	10,864,935,546	4,189,475	4,189,475	-	43,583	-	43,583
74	11,566,832,868	3,162,420	3,162,420	-	30,890	-	30,890
75	12,315,413,423	2,344,768	2,344,768	-	21,506	-	21,506
76	13,113,495,522	1,706,401	1,706,401	-	14,696	-	14,696
77	13,964,111,746	1,218,096	1,218,096	-	9,850	-	9,850
78	14,870,521,949	852,428	852,428	-	6,472	-	6,472
79	15,836,226,179	584,567	584,567	-	4,168	-	4,168
80	16,864,977,615	392,771	392,771	-	2,629	-	2,629
81	17,960,795,825	258,593	258,593	-	1,625	-	1,625
82	19,127,980,689	166,901	166,901	-	985	-	985
83	20,371,127,194	105,693	105,693	-	586	-	586
84	21,695,141,387	65,763	65,763	-	342	-	342
85	23,105,257,710	40,286	40,286	-	197	-	197
86	24,607,057,886	24,364	24,364	-	112	-	112
87	26,206,491,505	14,595	14,595	-	63	-	63
88	27,909,898,392	8,694	8,694	-	35	-	35
89	29,724,032,815	5,172	5,172	-	20	-	20
90	31,656,089,610	3,083	3,083	-	11	-	11
91	33,713,732,253	1,845	1,845	-	6	-	6
92	35,905,122,946	1,108	1,108	-	3	-	3
93	38,238,954,793	667	667	-	2	-	2
94	40,724,486,167	400	400	-	1	-	1
95	43,371,577,354	239	239	-	1	-	1
96	46,190,729,636	140	140	-	0	-	0
97	49,193,126,918	81	81	-	0	-	0
98	52,390,680,084	46	46	-	0	-	0
99	55,796,074,242	25	25	-	0	-	0
100	59,422,819,041	14	14	-	0	-	0
Totals					\$ 4,763,536,202	\$ -	\$ 4,763,536,202





Note the Net Plan Position is currently projected to grow since the Board has adopted a funding policy goal of more than 100% funded; therefore, even in the absence of contributions from the current active member population, the negative unfunded will continue to accrue interest.

SECTION H

GLOSSARY OF TERMS

Glossary of Terms

<i>Accrued Service</i>	Service credited under the system which was rendered before the date of the actuarial valuation.
<i>Actuarial Accrued Liability (AAL)</i>	The AAL is the difference between the actuarial present value of all benefits and the actuarial value of future normal costs. The definition comes from the fundamental equation of funding which states that the present value of all benefits is the sum of the Actuarial Accrued Liability and the present value of future normal costs. The AAL may also be referred to as accrued liability or actuarial liability.
<i>Actuarial Assumptions</i>	These assumptions are estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and compensation increases. Actuarial assumptions are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (compensation increases, payroll growth, inflation and investment return) consist of an underlying real rate of return plus an assumption for a long-term average rate of inflation.
<i>Actuarial Equivalent</i>	A single amount or series of amounts of equal actuarial value to another single amount or series of amounts, computed on the basis of appropriate actuarial assumptions.
<i>Actuarial Cost Method</i>	A mathematical budgeting procedure for allocating the dollar amount of the actuarial present value of the pension trust benefits between future normal cost and actuarial accrued liability. The actuarial cost method may also be referred to as the actuarial funding method.
<i>Actuarial Gain/(Loss)</i>	The difference in liabilities between actual experience and expected experience during the period between two actuarial valuations is the gain/(loss) on the accrued liabilities.
<i>Actuarial Present Value (APV)</i>	The amount of funds currently required to provide a payment or series of payments in the future. The present value is determined by discounting future payments at predetermined rates of interest and probabilities of payment.
<i>Actuarial Valuation</i>	The actuarial valuation report determines, as of the actuarial valuation date, the service cost, total pension liability, and related actuarial present value of projected benefit payments for pensions.
<i>Actuarial Valuation Date</i>	The date as of which an actuarial valuation is performed.
<i>Actuarially Determined Contribution (ADC) or Annual Required Contribution (ARC)</i>	A calculated contribution into a defined benefit pension plan for the reporting period, most often determined based on the funding policy of the plan. Typically, the Actuarially Determined Contribution has a normal cost payment and an amortization payment.

Glossary of Terms

<i>Amortization Method</i>	The method used to determine the periodic amortization payment may be a level dollar amount, or a level percent of pay amount. The period will typically be expressed in years, and the method will either be “open” (meaning, reset each year) or “closed” (the number of years remaining will decline each year).
<i>Amortization Payment</i>	The amortization payment is the periodic payment required to pay off an interest-discounted amount with payments of interest and principal.
<i>Cost-of-Living Adjustments</i>	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
<i>Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (cost-sharing pension plan)</i>	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
<i>Covered-Employee Payroll</i>	The payroll of covered employees, which is typically only the pensionable pay and does not include pay above any pay cap.
<i>Deferred Inflows and Outflows</i>	The deferred inflows and outflows of pension resources are amounts used under GASB Statement No. 68 in developing the annual pension expense. Deferred inflows and outflows arise with differences between expected and actual experiences; changes of assumptions. The portion of these amounts not included in pension expense should be included in the deferred inflows or outflows of resources.
<i>Deferred Retirement Option Program (DROP)</i>	A program that permits a plan member to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The plan member continues to provide service to the employer and is paid for the service by the employer after the DROP entry date; however, the pensions that would have been paid to the plan member are credited to an individual member account within the defined benefit pension plan until the end of the DROP period. Other variations for DROP exist and will be more fully detailed in the plan provision section of the valuation report.
<i>Discount Rate</i>	For GASB purposes, the discount rate is the single rate of return that results in the present value of all projected benefit payments to be equal to the sum of the funded and unfunded projected benefit payments, specifically: <ol style="list-style-type: none">1. The benefit payments to be made while the pension plans’ fiduciary net position is projected to be greater than the benefit payments that are projected to be made in the period; and2. The present value of the benefit payments not in (1) above, discounted using the municipal bond rate.

Glossary of Terms

<i>Entry Age Actuarial Cost Method (EAN)</i>	The EAN is a funding method for allocating the costs of the plan between the normal cost and the accrued liability. The actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis (either level dollar or level percent of pay) over the earnings or service of the individual between entry age and assumed exit age(s). The portion of the actuarial present value allocated to a valuation year is the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is the actuarial accrued liability. The sum of the accrued liability plus the present value of all future normal costs is the present value of all benefits.
<i>Fiduciary Net Position</i>	The fiduciary net position is the value of the assets of the trust.
<i>GASB</i>	The Governmental Accounting Standards Board is an organization that exists in order to promulgate accounting standards for governmental entities.
<i>Long-Term Expected Rate of Return</i>	The long-term rate of return is the expected return to be earned over the entire trust portfolio based on the asset allocation of the portfolio.
<i>Money-Weighted Rate of Return</i>	The money-weighted rate of return is a method of calculating the returns that adjusts for the changing amounts actually invested. For purposes of GASB Statement No. 67, money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.
<i>Multiple-Employer Defined Benefit Pension Plan</i>	A multiple-employer plan is a defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
<i>Municipal Bond Rate</i>	The Municipal Bond Rate is the discount rate to be used for those benefit payments that occur after the assets of the trust have been depleted.
<i>Net Pension Liability (NPL)</i>	The NPL is the liability of employers and non-employer contribution entities to plan members for benefits provided through a defined benefit pension plan.
<i>Non-Employer Contribution Entities</i>	Non-employer contribution entities are entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of the GASB Accounting Statement, plan members are not considered non-employer contribution entities.
<i>Normal Cost</i>	The actuarial present value of the pension trust benefits allocated to the current year by the actuarial cost method.

Glossary of Terms

<i>Other Postemployment Benefits (OPEB)</i>	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
<i>Real Rate of Return</i>	The real rate of return is the rate of return on an investment after adjustment to eliminate inflation.
<i>Service Cost</i>	The service cost is the portion of the actuarial present value of projected benefit payments that is attributed to a valuation year.
<i>Total Pension Expense</i>	The total pension expense is the sum of the following items that are recognized at the end of the employer’s fiscal year: <ol style="list-style-type: none">1. Service Cost2. Interest on the Total Pension Liability3. Current-Period Benefit Changes4. Employee Contributions (made negative for addition here)5. Projected Earnings on Plan Investments (made negative for addition here)6. Pension Plan Administrative Expense7. Other Changes in Plan Fiduciary Net Position8. Recognition of Outflow (Inflow) of Resources due to Liabilities9. Recognition of Outflow (Inflow) of Resources due to Assets
<i>Total Pension Liability (TPL)</i>	The TPL is the portion of the actuarial present value of projected benefit payments that is attributed to past periods of member service.
<i>Unfunded Actuarial Accrued Liability (UAAL)</i>	The UAAL is the difference between actuarial accrued liability and valuation assets.
<i>Valuation Assets</i>	The valuation assets are the assets used in determining the unfunded liability of the plan. For purposes of the GASB Statement No. 67, the valuation asset is equal to the market value of assets.