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Highway Patrol Officers' Retirement System of the State of Montana

MPERA
MONTANA PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION

Actuarial Valuation
As of June 30, 2022

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CONSULTING, LLC
The experience and dedication you deserve

September 26, 2022

Public Employees' Retirement Board
100 North Park, Suite 200
Helena, MT 59620-0139

Members of the Board:

In this report are submitted the results of the annual valuation of the assets and liabilities of the Highway Patrol Officers' Retirement System of the State of Montana (HPORS), prepared as of June 30, 2022.

The purpose of this report is to provide a summary of the funded status of the System as of June 30, 2022. While not verifying the data at source, the actuary performed tests for consistency and reasonability. The valuation indicates that the statutory contribution rate reflecting all anticipated contribution increases are sufficient to amortize the unfunded accrued liability within a 47-year period. The asset values used to determine unfunded liabilities are not market values but less volatile market related values. A smoothing technique is applied to market values to determine the market related values. The unfunded liability amounts using the market value of assets would be different. The interest rate used for determining liabilities is based on the expected return on assets. Therefore, liability amounts in the report cannot be used to assess a settlement of the obligation.

The promised benefits of the System are included in the actuarially calculated contribution rates, which are developed using the Entry Age Normal Cost Method. Four-year market related value of assets is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded accrued liability that is being amortized by regular annual contributions as a level percentage of payroll, on the assumption that payroll will increase by 3.25% annually. The assumptions recommended by the actuary and adopted by the Board, are in the aggregate, reasonably related to the experience under the Fund and to reasonable expectations of anticipated experience under the Fund.

In order to prepare the results in this report we have utilized appropriate actuarial models that were developed for this purpose. These models use assumptions about future contingent events along with recognized actuarial approaches to develop the needed results.

This is to certify that the undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. This also certifies that the undersigned have experience in performing valuations for public retirement systems, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement system and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the System.

Future actuarial results may differ significantly from the current results presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

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President

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Highway Patrol Officers' Retirement System
of the State of Montana

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Section I: Summary of Results

For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results are summarized below:

VALUATION DATE	June 30, 2022	June 30, 2021
Active members*	252	244
Disabled Members**	3	3
Retirees and Beneficiaries**	354	353
Terminated Vested Members	19	18
Terminated Non-Vested Members	38	30
Total***	666	648
Annual Covered Payroll of Active Members	$ 17,274,748	$ 16,630,576
Average Salaries from Covered Payroll	$ 68,551	$ 68,158
Annual Retirement Allowances for Retired Members and Beneficiaries	$ 13,628,447	$ 13,287,766
Assets		
Actuarial value	$ 179,360,586	$ 168,056,413
Market value	175,940,332	185,979,057
Actuarial Accrued Liability (AAL)	$ 273,240,808	$ 252,081,574
Unfunded Actuarial Accrued Liability (UAAL)	$ 93,880,222	$ 84,025,161
Funded Ratio	65.64%	66.67%
Market Value Rate of Return	(4.24%)	27.80%
Annual Cost		
Statutory Funding Rate	51.38%	51.38%
Total Normal Rate	28.78%	23.43%
Employee Contribution Rate****	13.05%	13.05%
Employer Normal Rate	15.73%	10.38%
Employer Contribution Rate		
Normal Rate	15.73%	10.38%
Administrative Expense Load	0.00%	0.19%
UAAL Rate	22.60%	27.76%
Total Rate	38.33%	38.33%
Amortization Period	47 years	26 years
Employer Contribution Rate Necessary to Amortize UAAL over 30 Years		
Normal Rate	15.73%	10.38%
Administrative Expense Load	0.00%	0.19%
UAAL Rate (30-Year Rate)	27.75%	25.19%
Total Rate	43.48%	35.76%
Shortfall/(Surplus)	5.15%	(2.57%)

* Includes 17 DROP members as of June 30, 2021 and 13 DROP members as of June 30, 2022.
** Based on PERB categorization for the annual report. For actuarial purposes, 21 members in 2021 and 21 members in 2022 were valued as disabled members with offsetting reductions to the number of retired members.
*** A reconciliation between participant counts used for the annual report and counts for the valuation appears at the beginning of Appendix D.
**** Rates shown are for the fiscal year following the valuation date.

As a result of this actuarial valuation of the benefits in effect under the Highway Patrol Officers' Retirement System as of June 30, 2022, the statutory employer contributions are sufficient to amortize the Unfunded Actuarial Accrued Liability (UAAL) of the Retirement System within 47 years. The Funded Ratio is 65.64%.

Calculations based on the Market Value of Assets

MCA 19-2-407 requires this report to show how market performance is affecting the actuarial funding of the Retirement System. The June 30, 2022 market value of assets is $3,420,254 more than the actuarial value of assets. This is due to the smoothing of investment gains and losses over a four-year period. If the market value of assets was used, the amortization period would be 53 years, and the Funded Ratio would be 64.39%.

Additional Details

MCA 19-6-404 sets the employer contribution at 28.15% of salary, the state contribution at 10.18% and MCA 19-6-402 sets the employee contribution at 13% for non-GABA actives (effective July 1, 2016) and 13.05% for GABA actives (effective July 1, 2016).

The actuarial costs are calculated using the entry age actuarial cost method. This is the method used by most public plans. It is designed to provide a stable contribution rate as a percent of member pay. This actuarial valuation measures the adequacy of the contribution rates set in Montana State Law.

House Bill 72, effective July 1, 2021, requires the state special revenue fund to transfer $4,000,000 by August 15, 2021, and $2,000,000 by August 15, 2022, and $500,000 by August 15 for each fiscal year thereafter until the plan is 100% funded.

Investment Experience

The market assets earned (4.24)% net of investment expenses. As a result of prior years' unrecognized losses, the actuarial assets earned 8.09%, which is 0.44% greater than the expected return of 7.65%. The return on the actuarial assets differs from the return on market assets because the actuarial value of assets spreads gains and losses over four years. The chart below shows the annual returns for the past ten years.

Year	Market Return	Actuarial Return	Assumed Investment Return	Market Return over Assumption	Actuarial Return over Assumption
7/1/2012 to 6/30/2013	12.88%	11.86%	7.75%	5.13%	4.11%
7/1/2013 to 6/30/2014	17.10	13.13	7.75	9.35	5.38
7/1/2014 to 6/30/2015	4.60	9.61	7.75	(3.15)	1.86
7/1/2015 to 6/30/2016	2.04	8.76	7.75	(5.71)	1.01
7/1/2016 to 6/30/2017	11.87	8.25	7.75	4.12	0.50
7/1/2017 to 6/30/2018	8.86	6.84	7.65	1.21	(0.81)
7/1/2018 to 6/30/2019	5.63	7.18	7.65	(2.02)	(0.47)
7/1/2019 to 6/30/2020	2.66	7.06	7.65	(4.99)	(0.59)
7/1/2020 to 6/30/2021	27.80	10.72	7.65	20.15	3.07
7/1/2021 to 6/30/2022	(4.24)	8.09	7.65	(11.89)	0.44

Asset gains and losses result when the return on the actuarial value of assets differs from the assumed actuarial investment return.

Amortization of the UAAL

The June 30, 2021 actuarial valuation calculated a 26-year amortization period for the UAAL. The resulting amortization period at June 30, 2022 is 47 years.

Funding and Benefits Policy

The Montana Public Employees' Retirement Board has adopted a Funding and Benefits Policy to provide general guidelines to help ensure decisions are made based on sound, consistent, and thoroughly examined criteria. The Funding and Benefits Policy includes guidance on the following topics:

1) Funding Requirement
   a) The Funding and Benefits Policy states:
      1. "The Entry Age Normal Cost Method shall be applied to the projected benefits in determining the Normal Cost and Actuarial Accrued Liability.
      2. Asset smoothing can be used in the valuation process to spread the recognition of investment gains and losses over a four-year period.
      3. The unfunded actuarial accrued liability should be amortized over a reasonable period of time and should not exceed 30 years on a rolling basis. Generally, the funding period should be constant or decreasing."
   b) Analysis: The liabilities of the System are determined using the Entry Age Normal Cost Method and are compared to the actuarial value of assets, which are developed using asset smoothing that recognizes gains and losses over a four-year period. The amortization period as of June 30, 2022 is 47 years based on actuarial value of assets. The contributions provided for in statute are not sufficient to fully amortize the unfunded actuarially accrued liability within 30 years if all assumptions are met.
2) Funding Objectives
   a) The Funding and Benefits Policy states: "The primary objectives are to: 1) ensure that the systems are financially sound and pay all benefits promised using assets accumulated from required employer and member contributions and investment income; and 2) achieve a well-funded status with a range of safety to absorb market volatility without creating a UAAL."
   b) Analysis: The contributions provided for in statute are not sufficient to fully amortize the unfunded actuarially accrued liability within 30 years. It is important to note that the normal cost rate for new hires is less than the current active population. As members terminate or retire, and are replaced with a member with a lower normal cost rate, more of the employer contribution will be available to amortize the unfunded accrued liability. As a result, the effective amortization period is less than the amortization period calculated in the actuarial valuation, which does not reflect new hires.

3) Benefit Enhancements

   a) The Funding and Benefits Policy states: “Proposals must provide funding from sources sufficient to cover future costs. Unfunded liabilities created by the proposal must be amortized over a period of time appropriate to the retirement system, but not more than 30 years.”

   b) Analysis: Without supplemental funding, a benefit enhancement would increase the amortization period of the unfunded actuarial accrued liability and further delay the goal of achieving a well-funded status with a range of safety to absorb market volatility without creating additional UAAL.

State Debt

Under HB 553, passed during the 2019 Legislative Session, the amount of pension system debt that amortizes over 30 years is to be included in the definition of “state debt”. The funding period for the current valuation is 47 years, so a state debt amount must be disclosed. Assuming a one-time payment is made on January 1, 2023, the state debt is $16.6 million. Based on the current valuation, this payment would reduce the funding period to 30 years.

Sensitivity to Future Experience

The valuation results are projections based on the actuarial assumptions. Actual experience will differ from these assumptions, either increasing or decreasing the ultimate cost. The following illustrations provide simple analyses on how the costs are sensitive to changes in the assumed rate of return.

Investment Return – The investment return generally has the largest impact on the funding of the System.

Impact of Assuming 1.0% Higher Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	65.64%	47 Years	$6.8
Higher Assumption 8.30%	74.06%	17 Years	4.7
Increase / (Decrease)	8.42%	(30) Years	($2.1)

Impact of Assuming 0.5% Higher Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	65.64%	47 Years	$6.8
Higher Assumption 7.80%	69.82%	26 Years	5.7
Increase / (Decrease)	4.18%	(21) Years	($1.1)

Impact of Assuming 0.5% Lower Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	65.64%	47 Years	$6.8
Lower Assumption 6.80%	61.53%	Does not amortize	7.9
Increase / (Decrease)	(4.11%)	N/A	$1.1

Impact of Assuming 1.0% Lower Investment Return			
	Funded Ratio	Amortization Period	Actuarially Determined Employer Contribution (Millions $)*
Current Assumption 7.30%	65.64%	47 Years	$6.8
Lower Assumption 6.30%	57.49%	Does not amortize	9.2
Increase / (Decrease)	(8.15%)	N/A	$2.4

* Amounts reflect estimated increase/(decrease) in FY2022 employer contributions only, in order to maintain the 47 year amortization period.

The future funding status of the System will be determined by the System's experience. The System's actual asset returns and retirement rates, as well as member longevity, salary increases, withdrawal rates, disability rates and future legislation will all impact the funding status of the System. The entry age normal cost method and four-year smoothing of asset gains and losses will help to provide a more orderly funding of the System's liabilities, but will not change the actual experience. The amortization period of the UAAL is not likely to decrease by the expected 1.0 year with each passing actuarial valuation. Instead, the amortization period is expected to decrease more or less than 1.0 years each year, reflecting gains and losses due to experience different than the actuarial assumptions.

Assumption Changes

Since the June 30, 2021 valuation, the Montana Public Employee Retirement Administration (MPERA) adopted the recommendations made in the experience study for the five-year period ending June 30, 2021. The assumption changes outlined below are effective July 1, 2022:

- Lowered the investment return assumption from 7.65% to 7.30%.
- Updated all mortality tables to the PUB2010 tables for public safety employees.
- Updated the rates of retirement, disability, and salary merit scale.
- Lowered the payroll growth assumption from 3.50% to 3.25%.

Benefit Changes

There have been no benefit changes since the previous valuation.

Contribution Changes

There have been no contribution changes since the previous valuation.

Method Changes

There have been no method changes since the previous valuation.

Impact of Changes

The following table summarizes how experience has changed the UAAL since the June 30, 2021 Actuarial Valuation. Further detail can be found in Tables 10 and 11.

Changes in the Unfunded Actuarial Accrued Liability (UAAL)

June 30, 2021 Valuation UAAL	$84,025,161
Normal Cost (Including Expenses)	3,376,325
Contributions	(13,137,117)
Interest	6,183,718
Expected June 30, 2022 UAAL	80,448,087
Experience (Gain)/Loss on Actuarial Liabilities	($2,320,274)
Experience (Gain)/Loss on Actuarial Assets	(730,043)
Assumption & Method Changes	16,482,452
Plan Changes	0
Total (Gain) / Loss	13,432,135
June 30, 2022 Valuation UAAL	93,880,222

Summary

* The System's actuarial value investment return of 8.09% for the year ended June 30, 2022 is 0.44% greater than the expected return of 7.65%. This represents an asset gain of $730,043 due to investment return being more than anticipated. As of June 30, 2022, the market value of assets was $175,940,332. As of June 30, 2022 the actuarial value of assets was $179,360,586. The June 30, 2022 market value of assets will be recognized in future actuarial valuations unless it is offset by returns greater than the 7.30% assumption.

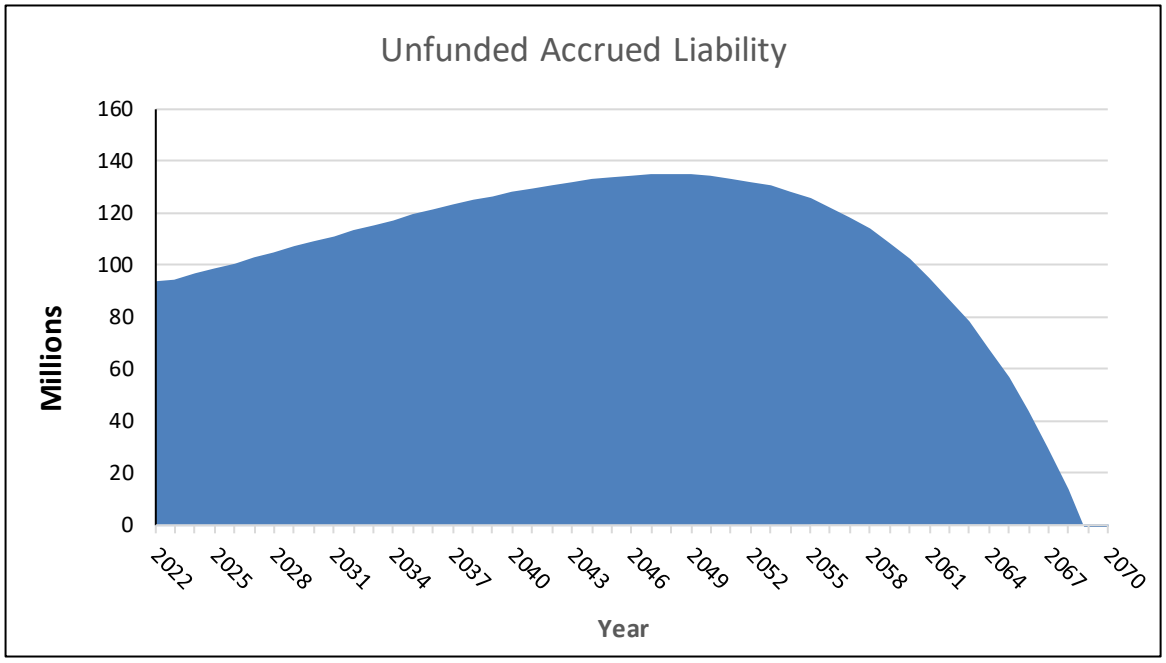
* As of June 30, 2022, the amortization period of the UAAL is 47 years. Prior to this valuation, the funding period was 26 years. The ultimate goal of the Board's Funding and Benefits Policy is to increase the funded status to a level such that the amortization period does not exceed 30 years.

* The funding of the retirement system will be impacted by future experience, which will sometimes be more favorable than the actuarial assumptions and sometimes less favorable. In particular, investment returns larger and smaller than the 7.30% assumption are expected to have significant impacts on the System's funding progress. In the long term, the favorable experience is needed to offset the less favorable experience. This is the reason for using an actuarial value of assets that allows gains and losses to be smoothed over four years.

  The unfunded actuarial accrued liability is amortized using a level percentage of payroll method over the amortization period. Under the level percentage of payroll method, amortization payments will not be large enough to cover interest on the UAAL in the beginning of the amortization schedule, which means that as a dollar amount the UAAL is expected to grow. After a period of time, amortization payments will be large enough that the amortization payments will cover both interest and principal, and the UAAL as a dollar amount will be projected to decrease in each subsequent year. The payroll growth assumption is used to determine the percentage of payroll required over the remaining amortization period to fully amortize the unfunded liability. The payroll growth assumption is 3.25%.

Projected Progress toward 100% Funding

The table below shows the projected progress toward reaching 100%. When the System is 100% funded, the Unfunded Actuarial Accrued Liability will be fully amortized. This is scheduled to occur within 47 years. The ultimate goal of the HPORS System is to become at least 100% funded and to establish a reserve.



Assets

In many respects, an actuarial valuation can be regarded as an inventory process. The inventory is taken as of the actuarial valuation date, which for this valuation is June 30, 2022. On that date, the assets available for the payment of benefits are appraised. These assets are compared with the actuarial liabilities. The actuarial process thus leads to a method of determining what contributions by members and their employers are needed to strike a balance.

The asset valuation method being used is a four-year smoothing method. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Table 1 lists the assets held and their market value for the past two years. Table 2 summarizes the fund's activity during the past two years. Table 3 summarizes the determination of the actuarial value of assets. Table 4 summarizes historical asset returns for the last 10 years including the amount recognized by the actuarial asset valuation method which was greater or lesser than the actuarial investment return assumption. Table 5 summarizes the historical asset values on a market value and actuarial value basis, to the extent it was available. Additional data can be included in this table for future reports, if provided by the System.

Table 1:
Statement of Fiduciary Net Position
Fiscal Year Ended June 30,

	2022	2021
ASSETS		
Cash and Short Term Investments	$ 2,545,254	$ 2,618,351
Securities Lending Collateral	$ 1,792,592	$ 1,061,986
Receivables:		
Interest Receivable	$ 1,940	$ 164
Accounts Receivable	609	18,252
Due from Other Funds	-	-
Due from Primary Government	-	-
Notes Receivable	-	-
Total Receivables	$ 2,549	$ 18,416
Investments, at fair value:		
Investment Pools	173,258,642	183,390,047
Other Investments	-	-
Total Investments	$ 173,258,642	$ 183,390,047
Capital Assets		
Property and Equipment, at cost, net of Accumulated Depreciation	$ 311	$ 311
Intangible Assets, at cost, net of Amortization Expense	192,376	210,882
Total Capital Assets	$ 192,687	$ 211,193
TOTAL ASSETS	$ 177,791,724	$ 187,299,993
LIABILITIES		
Securities Lending Liability	$ 1,792,591	$ 1,061,986
Accounts Payable	21,938	16,983
Unearned Revenue	-	-
Due to Other Funds	36,863	241,967
Compensated Absences	-	-
OPEB Implicit Rate Subsidy LT	-	-
TOTAL LIABILITIES	$ 1,851,392	$ 1,320,936
NET POSITION - RESTRICTED FOR PENSION BENEFITS	$ 175,940,332	$ 185,979,057

Table 2:
Statement of Changes in Fiduciary Net Position
Fiscal Year Ended June 30,

	2022	2021
ADDITIONS		
Contributions:		
Employer	$ 6,639,274	$ 6,423,043
Plan Member	2,284,710	2,206,028
Other	4,213,133	224,258
Total Contributions	$ 13,137,117	$ 8,853,329
Misc. Income	$ -	$ -
Investment Income:		
Net Appreciation/(Depreciation) in Fair Value of Investments	$ (6,599,815)	$ 42,319,021
Investment Earnings	8,004	4,742
Security Lending Income	18,747	12,958
Investment Income/(Loss)	$ (6,573,064)	$ 42,336,721
Investment Expense	(1,263,433)	(1,057,464)
Security Lending Expense	(4,119)	(2,543)
Net Investment Income/(Loss)	$ (7,840,616)	$ 41,276,714
Total Additions	$ 5,296,501	$ 50,130,043
DEDUCTIONS		
Benefit Payments	$ 13,735,628	$ 13,710,171
Refunds/Distributions	1,515,412	2,026,383
Refunds to Other Plans	6,880	-
Transfers to DCRP	-	-
Transfers to MUS-RP	-	-
OPEB Expense	-	-
Administrative Expense	77,306	342,178
Total Deductions	$ 15,335,226	$ 16,078,732
NET INCREASE (DECREASE) IN PLAN NET ASSETS	$ (10,038,725)	$ 34,051,311
NET POSITION - RESTRICTED FOR PENSION BENEFITS BEGINNING OF YEAR	$ 185,979,057	$ 151,967,709
ADJUSTMENT	-	(39,963)
END OF YEAR	$ 175,940,332	$ 185,979,057

Table 3:
Determination of Actuarial Value of Assets

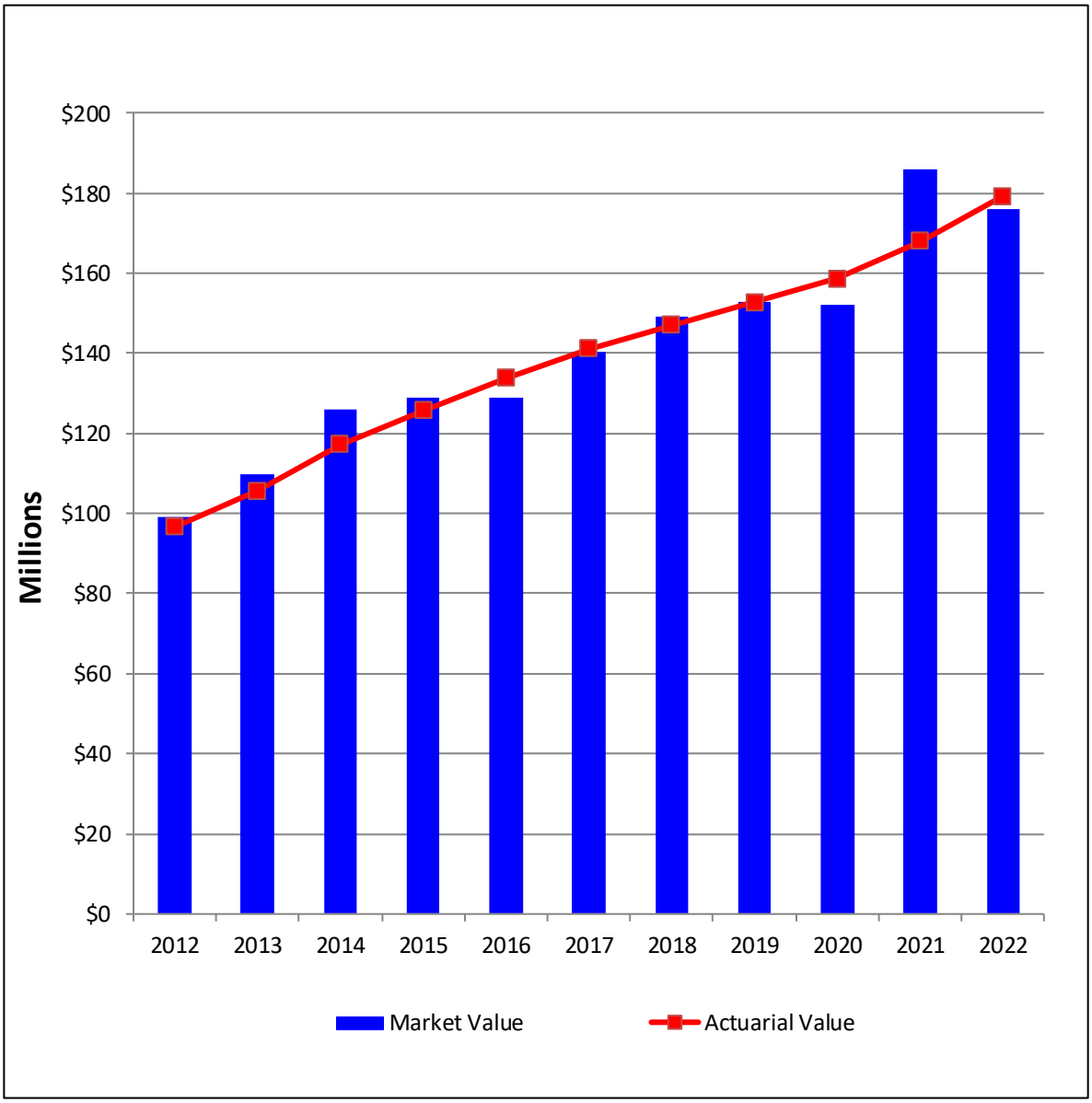
Valuation Date June 30:	2021	2022	2023	2024	2025
A. Actuarial Value Beginning of Year	$ 158,658,054	$ 168,056,413			
B. Market Value End of Year	185,979,057	175,940,332			
C. Market Value of Beginning of Year	151,967,709	185,979,057			
D. Cash Flow					
D1. Contributions	8,853,329	13,137,117			
D2. Benefit Payments	(15,736,554)	(15,257,920)			
D3. Administrative Expenses	(342,178)	(77,306)			
D4. Investment Expenses	(1,060,007)	(1,267,552)			
D5. Net	$ (8,285,410)	$ (3,465,661)			
E. Investment Income					
E1. Market Total: B. - C. - D5.	$ 42,296,758	$ (6,573,064)			
E2. Assumed Rate	7.65%	7.65%			
E3. Amount for Immediate Recognition C.*E2. + ((D1.+D2.+D3.)*E2.*0.5) - D4.	12,409,165	15,410,872			
E4. Amount for Phased-in Recognition E1. - E3.	29,887,593	(21,983,936)			
F. Phased-in Recognition of Investment Income					
F1. Current Year: 0.25 * E4.	$ 7,471,898	$ (5,495,984)	$ -	$ -	$ -
F2. First Prior Year	(1,876,101)	7,471,898	(5,495,984)	-	-
F3. Second Prior Year	(740,851)	(1,876,101)	7,471,898	(5,495,984)	-
F4. Third Prior Year	419,658	(740,851)	(1,876,101)	7,471,898	(5,495,984)
F5. Total Recognized Investment Gain	$ 5,274,604	$ (641,038)	$ 99,813	$ 1,975,914	$ (5,495,984)
G. Actuarial Value End of Year A. + D5. + E3. + F5.	$ 168,056,413	$ 179,360,586			

Table 4:
Historical Investment Returns*

Fiscal Year Ending	Market Returns	Actuarial Returns	Assumed Rate of Return	Actuarial Return Over Assumption
June 30, 2013	12.88%	11.86%	7.75%	4.11%
June 30, 2014	17.10%	13.13%	7.75%	5.38%
June 30, 2015	4.60%	9.61%	7.75%	1.86%
June 30, 2016	2.04%	8.76%	7.75%	1.01%
June 30, 2017	11.87%	8.25%	7.75%	0.50%
June 30, 2018	8.86%	6.84%	7.65%	(0.81)%
June 30, 2019	5.63%	7.18%	7.65%	(0.47)%
June 30, 2020	2.66%	7.06%	7.65%	(0.59)%
June 30, 2021	27.80%	10.72%	7.65%	3.07%
June 30, 2022	(4.24)%	8.09%	7.65%	0.44%
10 Year Average	8.59%	9.13%		1.43%

* Returns reflect all investment returns, including investment income and realized and unrealized investment gains and losses, and are net of investment expenses and administrative expenses paid by the System.

Table 5:
Market Value of Assets vs. Actuarial Value of Assets



Actuarial Present Value of Future Benefits

In the previous section, an actuarial valuation was related to an inventory process, and an analysis was given of the inventory of assets of the System as of the valuation date. In this section, the discussion will focus on the commitments of the System, which will be referred to as its actuarial liabilities.

Table 6 contains an analysis of the actuarial present value of all future benefits for active members, for retirees, and for beneficiaries. The analysis is given by type of benefit.

The actuarial liabilities summarized in Table 6 include the actuarial present value of all future benefits expected to be paid with respect to each member covered as of the valuation date. For an active member, this value includes a measure of both benefits already earned and future benefits to be earned. Thus, for all members, active and retired, the value extends over benefits earnable and payable for the rest of their lives and, if an optional benefit is chosen, for the lives of their surviving beneficiaries.

The actuarial valuation does not recognize liabilities for employees who become members and participate in the System after the valuation date.

Table 6:
Actuarial Present Value of Future Benefits for Actives, Retirees, and Beneficiaries

	June 30, 2022 Total	June 30, 2021 Total
A. Active Members Liability Due to Probability of		
Service Retirement	$ 88,268,204	$ 68,761,814
Disability Retirement	$ 3,169,032	$ 2,672,623
In-Service Death	$ 867,571	$ 1,140,603
Termination	$ 4,113,006	$ 3,524,484
Total	$ 96,417,813	$ 76,099,524
B. Inactive Members and Annuitants		
Service Retirement	$ 170,217,354	$ 162,492,158
Disability Retirement	$ 12,860,657	$ 12,011,710
Beneficiaries*	$ 26,569,990	$ 25,430,878
Vested Terminated Members	$ 1,938,482	$ 1,692,405
Refund of Member Contributions	$ 570,122	$ 377,836
Total	$ 212,156,605	$ 202,004,987
C. Grand Total	$ 308,574,418	$ 278,104,511

* Includes survivors of active and retired members

Employer Contributions

In the previous two sections, attention has been focused on the assets and the present value of all future benefits of the System. A comparison of Tables 3 and 6 indicates that there is a shortfall in current actuarial assets to meet the present value of all future benefits for current members and beneficiaries.

In an active system, there will always be a difference between the assets and the present value of all future benefits. An actuarial valuation sets a schedule of future contributions that will deal with this funding in an orderly fashion.

The method used to determine the incidence of the contributions in various years is called the actuarial cost method. For this valuation, the entry age actuarial cost method has been used. A description of the entry age actuarial cost method is provided in Appendix A. Under this method, or essentially any actuarial cost method, the contributions required to meet the difference between current assets and the present value of all future benefits are allocated each year between two elements:

- A normal cost amount, which ideally is relatively stable as a percentage of salary over the years;
- An amount which is used to amortize the UAAL.

The two items described above, normal cost and UAAL, are the keys to understanding the actuarial cost method. Let us first discuss the normal cost.

The normal cost is the theoretical contribution rate, which will meet the ongoing costs of a group of average new employees. Suppose that a group of new employees were covered under a separate fund from which all benefits and to which all contributions and associated investment return were to be paid. Under the entry age actuarial cost method, the normal cost contribution rate is that level percentage of pay which would be exactly right to maintain this fund on a stable basis. If experience were to follow the actuarial assumptions exactly, the fund would be completely liquidated with the last payment to the last survivor of the group.

The assumed investment rate of return is 7.30%, net of investment and administrative expenses.

We have determined the normal cost rates separately by type of benefit under the System. These are summarized in Table 7. In Table 7 we also provide a summary of the member and employer statutory contributions.

The term "fully funded" is often applied to a system where contributions for everyone at the normal cost rate will fully pay for the benefits of existing as well as new employees. Often, systems are not fully funded, either because of benefit improvements in the past that have not been completely paid for or actuarial deficiencies that have occurred because experience has not been as anticipated. Under these circumstances, a UAAL exists.

Table 8 shows how the UAAL was derived for the System. Lines A and B show, respectively, the total present value of future benefits and the portion of the future liability that is expected to be paid from future normal cost contributions, both employer and employee. The future normal cost contributions are the portion of the present value of future benefits that are attributed to future

years of service that have not been earned yet by the active membership. Line C shows the actuarial accrued liability. Line D shows the amount of assets available for benefits. Line E shows the UAAL.

The UAAL at any date after establishment of a system is affected by any actuarial gains or losses arising when the actual experience of the system varies from the experience anticipated by the actuarial assumptions used in the valuations. To the extent actual experience as it develops differs from the assumptions used, so also will the actual emerging costs differ from the estimated costs. The impact of these differences in actual experience from the assumptions is included in Section 1, the Summary of Findings.

Table 7:
Normal Cost Contribution Rates
As Percentages of Salary

	June 30, 2022 Total	June 30, 2021 Total
Service retirement	23.01%	18.27%
Disability retirement	2.09%	1.61%
In Service Death	0.52%	0.65%
Vested retirement	3.16%	2.90%
Total Normal Rate	28.78%	23.43%
Employee Normal Rate	13.05%	13.05%
Employer Normal Rate	15.73%	10.38%
Administrative Expense Load	0.00%	0.19%
Rate Available to Amortize Unfunded Actuarial Accrued Liability	22.60%	27.76%
Statutory Funding Rate*	51.38%	51.38%

* The rates shown are for the fiscal year following the valuation date.

Note: The normal cost rate for members hired on or after July 1, 2013 is 28.74%.

Table 8:
Unfunded Actuarial Accrued Liability

	June 30, 2022	June 30, 2021
A. Actuarial present value of all future benefits for present members and retirees and their survivors (Table 6)	$ 308,574,418	$278,104,511
B. Less actuarial present value of total future normal costs for present members	$ 35,333,610	$ 26,022,937
C. Actuarial accrued liability	$ 273,240,808	$252,081,574
D. Less assets available for benefits	$ 179,360,586	$168,056,413
E. Unfunded actuarial accrued liability	$ 93,880,222	$ 84,025,161

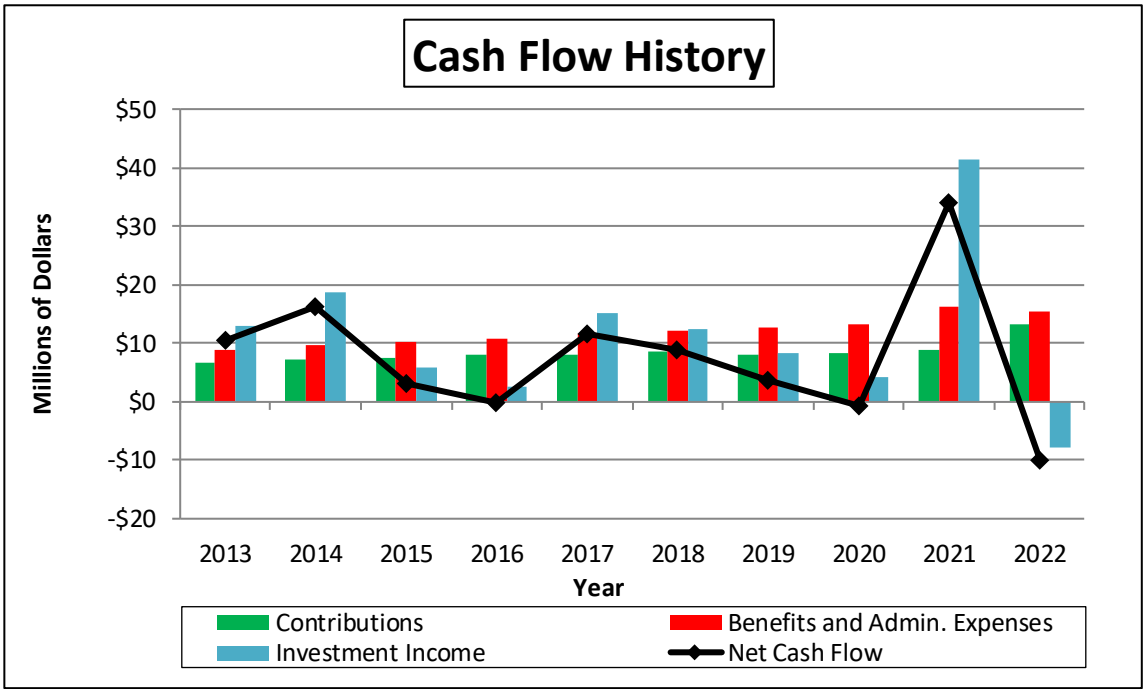
Cash Flows

The fundamental equation for funding a retirement system is that benefits and administrative expenses must be provided for by contributions (past and future) and investment income. When a retirement system matures, benefits and administrative expenses often exceed contributions. In this case we say the system has a "negative cash flow." Mature systems are characterized by negative cash flows and large pools of assets. This is natural. Actuarial funding is designed to accumulate large pools of assets which will in turn provide investment income and finance negative cash flows when systems mature. If the fund is looked at as a whole, investment income is usually larger than the difference between contributions and benefit payments. The retirement system's investment strategy should maximize potential returns at a prudent level of risk while providing for needed cash flows.

Table 9 shows the System had a negative cash flow for the year ended June 30, 2022. The System's total cash flow including benefit payments, administrative expenses and investment earnings was $(10.0) million. Of the $(10.0) million, $(7.8) million was due to investment returns.

If the System had a positive cash flow, there would be no need to plan where the funds would come from to pay benefits since benefits could be paid by incoming contributions. A negative cash flow, as defined above, requires planning what funds will be used to pay the difference between benefits and contributions.

Table 9:
Cash Flow History
(Dollar amounts in millions)



	Historical Cash Flows			
Year Ended June 30	Contributions	Benefits & Administrative Expenses	Investment Income	Net Cash Flow
2013	$ 6.5	$ 8.9	$ 12.8	$ 10.4
2014	7.2	9.6	18.7	16.3
2015	7.5	10.1	5.7	3.1
2016	8.1	10.8	2.6	(0.1)
2017	8.0	11.5	15.1	11.6
2018	8.5	12.1	12.3	8.7
2019	8.1	12.8	8.3	3.6
2020	8.4	13.2	4.1	(0.7)
2021	8.9	16.1	41.3	34.1
2022	13.1	15.3	(7.8)	(10.0)

Actuarial Gains or Losses

An analysis of actuarial gains or losses is performed in conjunction with all regularly scheduled valuations.

The developments of the gains or losses related to the actuarial liability and the assets are shown in Table 10. The results of our analysis of the financial experience of the System in the three most recent regular actuarial valuations are presented in Table 11.

Each gain or loss shown represents our estimate of how much the given type of experience caused the UAAL or Funding Reserve to change in the period since the previous actuarial valuation.

Gains and losses shown due to demographic sources are approximate. Demographic experience is analyzed in greater detail in our periodic experience studies.

Non-recurring gains and losses result from changes in the actuarial assumptions and benefit improvements.

Table 10:
Analysis of Actuarial (Gains) or Losses*

A.	ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS	
1.	Actual Actuarial Accrued Liability as of June 30, 2021:	$ 252,081,574
2.	Normal Cost for this Plan Year (Including Expenses)	3,376,325
3.	Interest on items 1 and 2 [(1+2) x 7.65%]	19,542,529
4.	Benefit Payments for this Plan Year (Including Expenses)	(15,335,226)
5.	Interest on item [4 x 7.65% x .5]	(586,572)
6.	Expected Actuarial Accrued Liability as of June 30, 2021:	$ 259,078,630
7.	Changes due to:	
	a. Assumption Changes	$ 16,482,452
	b. Plan Amendments	0
	c. Funding Method	0
	d. Actuarial (Gain) / Loss	$ (2,320,274)
8.	Actual Unfunded Actuarial Accrued Liability as of June 30, 2022:	$ 273,240,808
9.	Items Affecting Calculation of Unfunded Accrued Actuarial Liability:	
	a. Benefit provisions reflected in the unfunded accrued liability (see Appendix C)	
	b. Actuarial assumptions and methods used to determine actuarial accrued liability (see Appendix B)	
B.	ASSET (GAIN) / LOSS ANALYSIS	
1.	Actuarial Value of Assets as of June 30, 2021:	$ 168,056,413
2.	Interest on item [1 x 7.65%]	12,856,316
3.	Contributions for this Plan Year	13,137,117
4.	Interest on item [3. x 7.65% x .5]	502,495
5.	Benefit Payments for this Plan Year (Including Expenses)	(15,335,226)
6.	Interest on item [5. x 7.65% x .5]	(586,572)
7.	Expected Actuarial Value of Assets as of June 30, 2022:	$ 178,630,543
8.	Actuarial Value of Assets as of June 30, 2022:	$ 179,360,586
9.	(Gain) / Loss	$ (730,043)
C.	UNFUNDED ACTUARIAL ACCRUED LIABILITY (GAIN) / LOSS ANALYSIS	
1.	Actual Unfunded Actuarial Accrued Liability as of June 30, 2021:	$ 84,025,161
2.	Normal Cost for this Plan Year (Including Expenses)	$ 3,376,325
3.	Contributions for this Plan Year:	$ (13,137,117)
4.	Interest on items 1 - 3: [(1+2) x 7.65% + (3 x 7.65% x .5)]	$ 6,183,718
5.	Expected Unfunded Actuarial Accrued Liability as of June 30, 2022:	$ 80,448,087
6.	Changes due to:	
	a. Assumption Changes	16,482,452
	b. Plan Amendments	-
	c. Funding Method	-
	d. Actuarial (Gain) / Loss	$ (3,050,317)
7.	Actual Unfunded Actuarial Accrued Liability as of June 30, 2022:	$ 93,880,222

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.

Table 11:
Historical Actuarial (Gains) or Losses*
($ in thousands)

	UAAL (Gain)/Loss		
	June 30, 2022	June 30, 2021	June 30, 2020
Investment Income Investment income was (greater) less than expected based on actuarial value of assets.	$ (730.0)	$ (4,762.8)	$ 892.9
Pay Increases Pay increases were (less) greater than expected.	$ (924.7)	$ 944.4	$ 277.6
Age & Service Retirements Members retired at (older) younger ages or with (less) greater final average pay than expected	$ (229.7)	$ (594.2)	$ 547.9
Disability Retirements Disability claims were (less) greater than expected	$ (95.1)	$ 412.4	$ (90.3)
Death-in-Service Benefits Survivor claims were (less) greater than expected	$ (31.0)	$ (30.2)	$ (31.1)
Withdrawal From Employment (More) less reserves were released by withdrawals than expected	$ 466.0	$ 233.0	$ 346.2
Death After Retirement Retirees (died younger) lived longer than expected	$ (1,656.1)	$ (1,202.9)	$ (288.0)
Data Adjustments and Benefit Payment Timing Service purchases, data corrections, etc.	$ 153.3	$ 358.7	$ 403.5
Other Miscellaneous (gains) and losses	$ (3.0)	$ 285.9	$ 29.5
Total (Gain) or Loss During Period From Financial Experience	$ (3,050.3)	$ (4,355.7)	$ 2,088.2
Non-Recurring Items. Changes in actuarial assumptions and methods	$ 16,482.5	$ -	$ -
Changes in benefits caused a (gain) loss	$ -	$ -	$ -
Composite (Gain) Loss During Period	$ 13,432.2	$ (4,355.7)	$ 2,088.2

* Effects related to gains are shown in parentheses. Numerical results are expressed as a (decrease) increase in the Unfunded Actuarial Accrued Liability (UAAL). Gains decrease the UAAL and losses increase the UAAL.

A typical retirement plan faces many different risks, but the greatest risk is the inability to make benefit payments when due. If plan assets are depleted, benefits may not be paid which could create legal and litigation risk or the plan could become "pay as you go". The term "risk" is most commonly associated with an outcome with undesirable results. However, in the actuarial world, risk can be translated as uncertainty. The actuarial valuation process uses many actuarial assumptions to project how future contributions and investment returns will meet the cash flow needs for future benefit payments. Of course, we know that actual experience will not unfold exactly as anticipated by the assumptions and that uncertainty, whether favorable or unfavorable, creates risk. ASOP 51 defines risk as the potential of actual future measurements to deviate from expected results due to actual experience that is different than the actuarial assumptions.

The various risk factors for a given plan can have a significant impact – positive or negative – on the actuarial projection of liability and contribution rates.

There are a number of risks inherent in the funding of a defined benefit plan. These include:

- economic risks, such as investment return and price inflation;
- demographic risks such as mortality, payroll growth, aging population including impact of baby boomers, and retirement ages;
- contribution risk, i.e., the potential for contribution rates to be too high for the plan sponsor/employer to pay and
- external risks such as the regulatory and political environment.

There is a direct correlation between healthy, well-funded retirement plans and contributions sufficient to provide promised benefits. The System is primarily funded by member and employer contributions to the trust fund, together with the earnings on these accumulated contributions. These contributions fund benefit accruals for current active members and administrative expenses. The remainder of the contributions amortizes the unfunded actuarial accrued liability. The contribution rates are set by state statute and intended to provide the needed amounts to fund the system over time. The purpose of the valuation is to determine if the fixed contributions are sufficient to fund the Plan. Due to the fixed nature of the contributions actuarial gains and losses are reflected in the amortization period. Generally, the largest source of actuarial gains and losses are caused by investment volatility. In addition, the unfunded liability is amortized as a level percentage of pay assuming payroll will grow by 3.25% per year. A key risk factor to the System's funding is that over time, the Statutory Contribution Rates will be insufficient to accumulate enough funds, with investment income, to fund the promised benefits. The funding insufficiency can be caused by amortization periods that are too long or by payroll not growing at the assumed rate.

Historical Asset Volatility Ratios
(in 1,000's)

As a retirement system matures, the size of the market value of assets increases relative to the covered payroll of active members, on which the System is funded. The size of the plan assets relative to covered payroll, sometimes referred to as the asset volatility ratio, is an important indicator of the contribution risk for the System. The higher this ratio, the more sensitive a plan's contribution rate is to investment return volatility. In other words, it will be harder to recover from investment losses with increased contributions.

Actuarial Valuation Date	Market Value of Assets	Plan Year Payroll	Asset Volatility Ratio
6/30/2015	$ 129,067	$ 14,503	8.90
6/30/2016	128,973	15,276	8.44
6/30/2017	140,537	14,779	9.51
6/30/2018	149,199	15,251	9.78
6/30/2019	152,778	15,178	10.07
6/30/2020	151,968	15,608	9.74
6/30/2021	185,979	16,631	11.18
6/30/2022	175,940	17,275	10.18

The assets at June 30, 2022 are 1,018% of payroll, so underperforming the investment return assumption by 1.00% (i.e., earn 6.30% for one year) is equivalent to 10.18% of payroll. While the actual impact in the first year is mitigated by the asset smoothing method and amortization of the UAAL, this illustrates the risk associated with volatile investment returns.

Historical Cash Flows
(in 1,000's)

Plans with negative cash flows will experience increased sensitivity to investment return volatility. Cash flows, for this purpose, are measured as contributions less benefit payments and administrative expenses. If the System has negative cash flows and then experiences returns below the assumed rate, there are fewer assets to be reinvested to earn the higher returns that typically follow. While any negative cash flow will produce such a result, it is typically a negative cash flow of more than 5% of MVA that may cause significant concerns. The trend of the System's negative cash flow has been gradually increasing. While there is no immediate concern, this trend should be monitored closely going forward.

Year End	Market Value of Assets (MVA)	Contributions	Benefit Payments	Net Cash Flow	Net Cash Flow as a Percent of MVA
6/30/2015	$ 129,067	$ 7,464	$ 10,145	$ (2,681)	(2.08%)
6/30/2016	128,973	8,076	10,773	(2,697)	(2.09%)
6/30/2017	140,537	7,995	11,530	(3,535)	(2.52%)
6/30/2018	149,199	8,495	12,124	(3,629)	(2.43%)
6/30/2019	152,778	8,080	12,772	(4,692)	(3.07%)
6/30/2020	151,968	8,399	13,208	(4,809)	(3.16%)
6/30/2021	185,979	8,853	16,079	(7,226)	(3.89%)
6/30/2022	175,940	13,137	15,335	(2,198)	(1.25%)

Liability Maturity Measurement

Most public sector retirement systems have been in operation for many years. As a result, they have aging plan populations, and in some cases declining active populations, resulting in an increasing ratio of retirees to active members and a growing percentage of retiree liability. The retirement of the remaining baby boomers over the next decade is expected to further exacerbate the aging of the retirement system population. With more of the total liability residing with retirees, investment volatility has a greater impact on the funding of the system since it is more difficult to restore the system financially after losses occur when there is comparatively less payroll over which to spread costs. Below are two tables which demonstrate the ratio of the System's retiree liability compared to the total accrued liability and the ratio of the number of retirees and beneficiaries to the number of active members.

Year End	Retiree Liability (a)	Total Actuarial Accrued Liability (b)	Retiree Percentage (a) / (b)
6/30/2015	$134,998,449	$192,982,843	70.0%
6/30/2016	148,324,629	203,325,693	73.0%
6/30/2017	166,272,699	219,469,619	75.8%
6/30/2018	177,187,335	229,821,775	77.1%
6/30/2019	187,185,591	236,805,027	79.0%
6/30/2020	198,806,437	245,915,150	80.8%
6/30/2021	202,004,987	252,081,574	80.1%
6/30/2022	212,156,605	273,240,808	77.6%

Historical Member Statistics

Valuation Date June 30,	Number of Active	Number of Retired	Active/ Retired
2015	241	327	0.74
2016	228	329	0.69
2017	238	341	0.70
2018	233	351	0.66
2019	232	342	0.68
2020	233	350	0.67
2021	244	356	0.67
2022	252	357	0.71

The assumptions and methods utilized in the valuation were developed in the five-year experience study for the period ending June 30, 2021.

Tables B-3 through B-5 give rates of decrement for service retirement, disablement, mortality, and other terminations of employment.

Actuarial Cost Method

The actuarial valuation was prepared using the entry age actuarial cost method. Under this method, the actuarial present value of the projected benefits of each individual included in the valuation is allocated as a level percentage of the individual's projected compensation between entry age and assumed exit. The portion of this actuarial present value allocated to a valuation year is called the normal cost. The normal cost was first calculated for each individual member. The normal cost rate is defined to equal the total of the individual normal costs, divided by the total pay rate.

The portion of this actuarial present value not provided for at a valuation date by the sum of (a) the actuarial value of the assets and (b) the actuarial present value of future normal costs is called the UAAL. The UAAL is amortized as a level percentage of the projected salaries of present and future members of the System.

Records and Data

The data used in the valuation consists of financial information; records of age, sex, service, salary, contribution rates, and account balances of contributing members; and records of age, sex, and amount of benefit for retired members and beneficiaries. All of the data was supplied by the System and has been accepted for valuation purposes without audit.

Replacement of Terminated Members

The ages at entry and distribution by sex of future members are assumed to average the same as those of the present members they replace. If the number of active members should increase, it is further assumed that the average entry age of the larger group will be the same, from an actuarial standpoint, as that of the present group. Under these assumptions, the normal cost rates for active members will not vary with the termination of present members.

Administrative and Investment Expenses

The administrative and investment expenses of the System are assumed to be funded by investment earnings in excess of 7.30% per year.

Valuation of Assets

The actuarial asset valuation method spreads asset gains and losses over four years. The expected return is determined each year based on the beginning of year market value and actual cash flows during the year. Any difference between the expected market value return and the actual market value return is recognized evenly over a period of four years.

Investment Earnings

The annual rate of investment earnings of the assets of the System is assumed to be 7.30% per year net of administrative and investment expenses, compounded annually.

Interest on Member Contributions

Interest on member contributions is assumed to accrue at the most recent rate granted, or a rate of 0.22% per annum, compounded annually.

Future Salaries

The rates of annual salary increase assumed for the purpose of the valuation are illustrated in Table B-2. In addition to increases in salary due to merit and longevity, this scale includes an assumed 3.50% annual rate of increase in the general wage level of the membership.

Service Retirement

Table B-3 shows the annual assumed rates of retirement among members eligible for service retirement. Separate rates are used when a member is eligible for reduced benefits, for the first year a member is eligible for full benefits, and for the years following the first year a member is eligible for full benefits.

Disablement

The rates of disablement used in this valuation are illustrated in Table B-4.

Mortality

The mortality rates used in this valuation are described in Table B-1.

Other Terminations of Employment

The rates of assumed future withdrawal from active service for reasons other than death, disability or retirement are shown for representative ages in Table B-5.

Probability of Marriage & Dependent Children

If death occurs in active status, all members are assumed to have an eligible surviving spouse with no dependent children. Female spouses are assumed to be three years younger than their male spouse.

Records with no Birth Date

New records with no birth date are assumed to be 37 years old. Records that are not new and have no birth date used the same birth date as the prior year's valuation.

Active Records with a Salary Less than $1,000

These members are included in the active headcounts, however the pay of these members is not included in the Valuation Projected Salaries summarized in Appendix D. The liability for these members is their accumulated member contributions payable on the valuation date.

Table B-1

Summary of Valuation Assumptions

I.	Economic assumptions	
	A. General wage increases	3.50%
	B. Investment return	7.30%
	C. Price inflation assumption	2.75%
	D. Payroll growth	3.25%
	E. Growth in membership	0.00%
	F. Interest on member accounts	0.22%
	G. Interest on DROP accounts	7.30%
II.	Demographic assumptions	
	A. Individual salary increase due to promotion and longevity	Table B-2
	B. Retirement	Table B-3
	C. Disablement	Table B-4
	D. Mortality among contributing members PUB 2010 Safety Amount Weighted Employee Mortality Table projected to 2021. Projected generationally using MP-2021.	
	E. Mortality among service retired members PUB 2010 Safety Amount Weighted Healthy Retiree Mortality Table projected to 2021, set forward one year for males and adjusted 105% for males and 100% for females. Projected generationally using MP-2021.	
	F. Mortality among beneficiaries PUB 2010 Safety Amount Weighted Contingent Survivor Mortality Table projected to 2021, set forward one year for males. Projected generationally using MP-2021.	
	G. Mortality among disabled members PUB 2010 Safety Amount Weighted Disabled Retiree Mortality Table projected to 2021, set forward one year for males.	
	H. Other terminations of employment	Table B-5

Table B-2

Future Salaries

Years of Service	(a) Individual Merit & Longevity	(b) General Wage Increase	(1+(a))*(1+(b)) Total Salary Increase
0-1	6.40%	3.50%	10.12%
1-2	4.70	3.50	8.36
2-3	3.60	3.50	7.23
3-4	2.70	3.50	6.29
4-5	2.00	3.50	5.57
5-6	1.40	3.50	4.95
6 & Up	1.00	3.50	4.54

Table B-3

Retirement
Annual Rates

Age	Less than 26 Years of Service	26 of more Years of Service
Less than 50	35.0%	55.0%
50 - 54	35.0	55.0
55 - 59	35.0	55.0
60 & Over	35.0	100.0

Table B-4

Disablement
Annual Rates

Age	All Members
22	0.00%
27	0.11
32	0.11
37	0.11
42	0.37
47	0.37
52	0.37
57	0.36
62	0.00

75% of disabilities are assumed to be duty-related. All disabilities are assumed to be permanent and without recovery.

Table B-5

Other Terminations of Employment
Among Members Not Eligible to Retire
Annual Rates

Years of Service	All Members
0 - 1	12.0%
1 - 4	7.5
4 - 10	5.0
10 - 15	3.0
15 & Over	1.0

Service credit	• Service credit is used to determine the amount of a member's retirement benefit. • One month of service credit is earned for each month where the member is paid for 160 hours. This includes certain transferred and purchased service.
Membership service	• Membership service is used to determine eligibility for vesting, retirement or other benefits. • One month of membership service is earned for any month member contributions are made, regardless of the number of hours worked. • Eligible members in all systems may purchase service that counts toward membership service. • Additionally, eligible active and inactive Sheriffs' Retirement System (SRS) members may purchase 1 for 5 (additional) service that will count as membership service.
Contributions	• Member contributions are made through an "employer pick- up" arrangement which results in deferral of taxes on the contributions.
Compensation	• Compensation generally means all remuneration paid, excluding certain allowances, benefits, and lump sum payments. Compensation is specifically defined in law and differs amongst the systems. • Bonuses paid **on or after** July 1, 2013 to any member will not be treated as compensation for retirement purposes. No member or employer contributions will be paid on bonuses.
Withdrawal of employee contributions	• A member is eligible for a withdrawal of their contributions when they terminate service and are either not eligible for or have not taken a retirement benefit. • The member receives the accumulated member contributions, which consists of member contributions and regular interest. • Upon receipt of a refund of accumulated contributions a member's vested right to a monthly benefit is forfeited.

Member contributions interest credited (regular interest)

- Interest is credited to member accounts at the rates determined by the Board.
- The current interest rate credited to member accounts was 0.22%.

Working Retiree Limitations -

Applies to retirement system members who return **on or after** July 1, 2017 to covered employment in the system from which they retired. These limits already applied to SRS members before July 1, 2017.

- Members who return for **less than 480 hours** in a **calendar** year:
  - may not become an active member in the system; and
  - are subject to a $1 reduction in their retirement benefit for each $3 earned in excess of $5,000 in the calendar year.
- Members who return for **480 or more hours** in a **calendar** year;
  - must become an active member of the system;
  - will stop receiving a retirement benefit from the system; **and**
  - will be eligible for a second retirement benefit if they earn 5 or more years of service credit through their second employment.
- Employee, employer and state contributions apply as follows:
  - Employer contributions and state contributions (if any) must be paid on all working retirees;
  - Employee contributions must be paid on working retirees who return to covered employment for 480 or more hours in a calendar year.

NOTE: PERS has its own limits.

Second Retirement Benefit

Applies to retirement system members who return on or after July 1, 2017 to active service covered by the system from which they retired.

- If the member works more than 480 hours in a calendar year and accumulates less than 5 years of service credit before terminating again, the member:
  - is not awarded service credit for the period of reemployment;
  - is refunded the accumulated contributions associated with the period of reemployment;
  - starting the first month following termination of service, receives the same retirement benefit previously paid to the member; and
  - does not accrue post-retirement benefit adjustments during the term of reemployment but receives a GABA in January immediately following second retirement.
- If the member works more than 480 hours in a calendar year and accumulates at least 5 years of service credit before terminating again, the member:
  - is awarded service credit for the period of reemployment;
  - starting the first month following termination of service, receives:
    * the same retirement benefit previously paid to the member; **and**
    * a second retirement benefit for the period of reemployment calculated based on the laws in effect as of the member's rehire date; **and**
  - does not accrue post-retirement benefit adjustments during the term of reemployment but receives a GABA:
    * on the initial retirement benefit in January immediately following second retirement; **and**
    * on the second retirement benefit starting in January after receiving that benefit for at least 12 months.
- A member who returns to covered service is **not** eligible for a disability benefit.

Refunds	• Terminating members eligible to retire may, in lieu of receiving a monthly retirement benefit, refund their accumulated contributions in a lump sum. • Terminating members with accumulated contributions between $200 and $1,000 who wish to rollover their refund must do so within 90 days of termination of service. • Trusts, estates, and charitable organizations listed as beneficiaries are entitled to receive only a lump sum payment.
Lump-sum payouts	• Effective July 1, 2017, lump sum payouts in all systems are limited to the member's accumulated contributions rather than the present value of the member's benefit.
Type of plan	• Single-employer defined benefit
Membership eligibility	• All members of the Montana highway patrol including supervisors and assistant supervisors
Member contributions	• 13% of member's compensation, **not covered** by GABA • 13.05% of member's compensation, **covered** by GABA • Effective July 1, 2014, member contributions increase 1% annually through the fiscal year ending 2017.
Employer contributions	• 28.15% of member's compensation
State contributions	• 10.18% of each member's compensation paid from the General Fund
Compensation period used in benefit calculation	• HAC = Highest Average Compensation • HAC is average of the highest 36 consecutive months (or shorter period of total service) of compensation paid to member. • Hired **on or after** July 1, 2013: 110% annual cap on compensation considered as part of a member's HAC.
Service retirement eligibility and benefit	• 20 years of membership service • 2.6% of HAC x years of service credit

Early retirement eligibility and benefit

- Hired **prior to** July 1, 2013:
  Any age with **5 years** of membership service; if discontinued from service other than for cause.
- Hired **on or after** July 1, 2013:
  Any age with **10 years** of membership service; if discontinued from service other than for cause.
- Normal retirement benefit calculated using HAC and service credit at early retirement, and reduced to the actuarial equivalent of a service retirement benefit based on a retirement age of 60.

Disability eligibility and benefit

Duty-related disability:

- Any active member
- **Less than 20 years** of membership service:
  50% of HAC, or
- **20 years or more** of membership service:
  2.6% of HAC x years of service credit

Regular disability:

- Any vested member
- The actuarial equivalent of the normal retirement benefit based on retirement age of 60.

Survivor's eligibility and benefit

Duty-related deaths:

- Active member
- A monthly survivor benefit to the surviving spouse or dependent child: 50% of HAC of the member.

Non-duty-related death:

- Active or inactive member
- Member's spouse will receive (or, if there is no surviving spouse or after the surviving spouse dies, each dependent child for as long as they remain dependent children) will equally receive a benefit: The actuarial equivalent of the early retirement benefit.
- A beneficiary may elect to receive the present value of the benefit as a single lump sum.
- For retired members without a surviving spouse or dependent child, the member's designated beneficiary will receive a payment equal to the retired member's accumulated contributions reduced by any retirement benefits already paid.

Vesting eligibility and benefit	• Hired **prior to** July 1, 2013: 5 years of membership service • Hired **on or after** July 1, 2013: 10 years of membership service. • Accrued normal retirement benefit, payable when eligible for retirement. • In lieu of a pension, a member may receive a refund of accumulated contributions. • Upon receipt of a refund of accumulated contributions, a member's vested right to a monthly benefit is forfeited.
Retirement benefits - Form of payment	• The retirement benefit is paid for the retired member's life. • Upon the death of the retired member, the benefit is paid to the surviving spouse. • If there is no surviving spouse, or after the death of a surviving spouse, benefits are paid to the dependent children, if any, for as long as they remain dependent children.
Post retirement benefit increases	• For retired members who either became active members **on or after** July 1, 1997 **and before** July 1, 2013, **or** who were hired **before** July 1, 1997 **and elected** to be covered under GABA, and who have been retired at least 12 months, a GABA will be paid each year in January equal to 3%. • For retired members who were hired **prior to** July 1, 1997 **and** did **not elect** GABA, the minimum monthly benefit provided is equal to 2% x service credit x the current base compensation of a probationary highway patrol officer. Such benefit may not exceed 60% of the current base compensation of a probationary highway patrol officer and the annual increase may not exceed 5% of the current benefit. • For retired members who became active members **on or after** July 1, 2013, **and** who have been retired at least 36 months, a GABA will be paid each year in January equal to 1.5%. • For **non-GABA** members who retired **prior to** July 1, 1991 **and** meet eligibility requirements, a supplemental lump sum payment will be made each year based on the increase in the Consumer Price Index.

Changes since last valuation	• None.

HPORS Deferred Retirement Option Plan (DROP)

Effective October 1, 2015, eligible members of the Highway Patrol Officers' Retirement System (HPORS) have the opportunity to participate in the DROP. The DROP allows active HPORS members to begin accumulating their retirement benefit, without terminating employment, for up to 60 months. If a member chooses to join the DROP, their monthly retirement benefit and their employee contributions will go into their individual DROP account.

Eligibility	• Active members of HPORS with **at least 20 years** of membership service.
Period	• Minimum of one month up to a maximum of five years. The member will not earn additional membership service or service credit.
Member contributions	• While a member is working, the member's contributions go into the DROP Participant's DROP Account.
Member contributions interest credited	• A member's DROP account will earn an interest rate equal to the actuarial assumed rate of return. Currently the rate of return is 7.30%.
Employer contributions	• While a member is working, the member's employer and the State will pay the regular contributions to HPORS.
Terminate employment	• When the member terminates employment at the end of the DROP Period the member will begin receiving the HPORS monthly retirement benefit. At this time, members will receive the DROP Benefit as a lump sum payment or a direct rollover to another eligible retirement plan (as allowed by the IRS). If the member does not designate a distribution method within 60 days after termination of employment, the DROP Benefit will be paid in a taxable lump sum. • If a member's HPORS-covered employment is terminated during the DROP Period, the DROP Benefit will be distributed to the member and payment of the monthly service retirement benefit will begin.

Disability	• If the member becomes disabled during the DROP Period, the member will not be eligible for HPORS disability benefits. If the member terminates service, the service retirement benefit will be paid to the member rather than to the monthly DROP Account. The member will also be eligible to receive the DROP Benefit.
Survivor Benefit	• If a member dies before the end of the DROP Period, the member's surviving spouse or dependent children are entitled to the member's DROP Benefit and the benefit they would have received had the member retired. • If the member does not have a surviving spouse or dependent children, the member's designated beneficiary receives the balance of the member's retirement account and a lump-sum payment of the member's DROP Benefit.
Benefit	• A member may continue to work after the DROP Period ends and remain vested in HPORS. The member will not receive the service retirement benefit or the DROP Benefit during the time the member continues working. The balance of the DROP Account will continue to earn interest. • Upon termination of employment, the member will receive the initial HPORS monthly retirement benefit; an additional benefit based on the member's service credit and highest average compensation earned after DROP participation; and the DROP Benefit.
Post retirement benefit increases	• Members do not receive the Guaranteed Annual Benefit Adjustment (GABA) on the accrued DROP retirement benefit. GABA starts January 1 immediately following retirement for initial and subsequent retirement benefits.
Changes since last valuation	• None

Valuation Data

This chart is presented for informational purposes only. The counts shown in the valuation line were used for preparation of the liabilities disclosed within this report. The counts disclosed for the Annual Financial Report and the Summary of Results (page 1) match the Financial Statements at the request of the Board. The differences between counts, if any, have no material effect upon the liability calculation.

	Active	Disabled	Retirees and Beneficiaries	Terminated Vested Members	Terminated Non-Vested Members	Total
Participant Counts Used for Valuation	238	24	346	19	38	665
Disabled Members having attained normal retirement age		(21)	21			
Beneficiaries of Disabled Members						
Beneficiaries with less than one year of certain payments remaining						
DROP Members	13		(13)			
Other Adjustments	1					1
Participant Counts shown in the Annual Financial Report	252	3	354	19	38	666

Appendix D: Valuation Data

This valuation is based upon the membership of the System as of June 30, 2022. Membership data was supplied by the System and has been accepted for valuation purposes without audit. However, tests were performed to ensure that the data was sufficiently accurate for valuation purposes.

The salaries used in the tables and charts which follow are different than the salaries used for the Summary of Results on page 1. The valuation salaries are anticipated to be paid for the following fiscal year, whereas the Summary of Results salaries are applicable in the year ending on the valuation date.

Active Members	Number	Valuation Projected Salaries
Full-Time Members	222	$ 16,119,847
Part-Time Members	16	$ 400,576
Total Active Members*	238	$ 16,520,423

* Data from the 13 DROP participants are excluded from the table above.

Table D-1 contains summaries of the data for active members. For full-time members, values shown in the tables are the numbers of members and their total and average annual salaries. For part-time members, only the numbers of members are shown.

Table D-2 presents distributions of the following:

- Members receiving service retirement benefits.
- Members receiving disability retirement benefits.
- Survivors of deceased retired members receiving benefits.
- Survivors of deceased active members.
- Terminated vested members.

Table D-3 is a reconciliation of membership data from June 30, 2021 to June 30, 2022.

The following is a summary of retired members and beneficiaries currently receiving benefits. The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 46 for an explanation of the number of annuitants used for valuation purposes.

Type of Annuitant	Number	Annual Benefits	Average Annual Benefits
Service Retirement	250	$ 10,217,910	$ 40,872
DROP Members	13	587,238	45,172
Total Service Retired Members	263	$ 10,805,148	$ 41,084
Survivors of Deceased Retired Members	74	$ 2,466,965	$ 33,337
Survivors of Deceased Active Members	9	202,834	22,537
Total Survivors and Beneficiaries	83	$ 2,669,799	$ 32,166
Disability Retirement	24	740,738	30,864
Total Annuitants	370	$ 14,215,685	$ 38,421

Terminated Members with Contributions Not Withdrawn	Number
Vested Terminated Members	19
Non-Vested Terminated Members	38
Total Terminated Members	57

Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2022

Number of Employees

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	5	5	4										14
25 to 29	7	1	8	11	6								33
30 to 34	3	13	2	5	16								39
35 to 39	1	3	2	5	18	9	1						39
40 to 44		4	1		9	13	13	2					42
45 to 49		1			3	6	13	5					28
50 to 54					2	2	5	3	1				13
55 to 59					1	2	6	3					12
60 to 64							1						1
65 to 69							1						1
70 and up													
Totals	16	27	17	21	55	32	40	13	1				222

* Data from the 13 DROP participants is excluded from the table above.

Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2022

Annual Salaries in Thousands

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	314	317	258										889
25 to 29	398	69	525	742	401								2,135
30 to 34	185	809	145	346	1,155								2,641
35 to 39	65	188	160	331	1,241	747	86						2,819
40 to 44		258	81		623	1,047	1,121	159					3,290
45 to 49		65			206	479	982	462					2,195
50 to 54					126	143	399	295	90				1,053
55 to 59					66	138	483	256					944
60 to 64							85						85
65 to 69							70						70
70 and up													
Totals	962	1,706	1,170	1,420	3,818	2,556	3,226	1,173	90				16,120

* Data from the 13 DROP participants is excluded from the table above.
The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.

Table D-1:
Active Members Distribution of
Full-Time Employees and Salaries
as of June 30, 2022

Average Annual Salary

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	62,786	63,323	64,511										63,471
25 to 29	56,877	68,659	65,613	67,449	66,889								64,696
30 to 34	61,773	62,219	72,510	69,299	72,182								67,707
35 to 39	64,752	62,831	80,215	66,271	68,951	83,018	85,905						72,288
40 to 44		64,574	81,161		69,217	80,564	86,262	79,392					78,332
45 to 49		65,302			68,640	79,916	75,560	92,440					78,400
50 to 54					63,119	71,659	79,742	98,353	89,642				80,997
55 to 59					65,535	69,193	80,523	85,491					78,627
60 to 64							85,092						85,092
65 to 69							69,759						69,759
70 and up													
Totals	60,134	63,193	68,798	67,609	69,418	79,865	80,657	90,193	89,642				72,612

* Data from the 13 DROP participants is excluded from the table above.
The salary shown in the above chart was used for valuation purposes and assumes pay increases for the year.

Table D-1:
Active Members Distribution of
Part-Time Employees
as of June 30, 2022

Number of Employees

	Completed Years of Service												
Age	0	1	2	3 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40+	Totals
<25	3												3
25 to 29	6		1										7
30 to 34	1	1											2
35 to 39	2					1							3
40 to 44					1								1
45 to 49													
50 to 54													
55 to 59													
60 to 64													
65 to 69													
70 and up													
Totals	12	1	1		1	1							16

Table D-2:
Distribution of Inactive Lives

The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 46 for an explanation of the number of annuitants used for valuation purposes.

Members Receiving Service Retirement Benefits as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	10	$ 357,568	$ 35,757
50 to 54	28	1,140,122	40,719
55 to 59	39	1,588,101	40,721
60 to 64	37	1,396,840	37,752
65 to 69	22	906,367	41,198
70 to 74	36	1,638,628	45,517
75 to 79	31	1,381,882	44,577
80 to 84	34	1,419,256	41,743
85 to 89	11	323,986	29,453
90 and up	2	65,160	32,580
Totals	250	$ 10,217,910	$ 40,872

Members Receiving Disability Retirement Benefits as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	3	$ 101,815	$ 33,938
50 to 54	5	171,245	34,249
55 to 59	5	111,062	22,212
60 to 64	4	141,284	35,321
65 to 69	2	68,777	34,389
70 to 74	2	60,094	30,047
75 to 79	1	30,358	30,358
80 to 84	2	56,103	28,051
85 to 89	-	-	-
90 and up	-	-	-
Totals	24	$ 740,738	$ 30,864

Table D-2:
Distribution of Inactive Lives

The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 46 for an explanation of the number of annuitants used for valuation purposes.

Survivors of Deceased Retired Members as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	-	$ -	$ -
50 to 54	2	37,492	18,746
55 to 59	3	109,679	36,560
60 to 64	5	167,061	33,412
65 to 69	7	283,399	40,486
70 to 74	6	202,067	33,678
75 to 79	14	425,801	30,414
80 to 84	19	680,766	35,830
85 to 89	12	407,066	33,922
90 and up	6	153,634	25,606
Totals	74	$ 2,466,965	$ 33,337

Survivors of Deceased Active Members as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	4	$ 101,389	$ 25,347
50 to 54	1	7,230	7,230
55 to 59	1	8,194	8,194
60 to 64	1	30,358	30,358
65 to 69	-	-	-
70 to 74	1	15,639	15,639
75 to 79	1	40,024	40,024
80 to 84	-	-	-
85 to 89	-	-	-
90 and up	-	-	-
Totals	9	$ 202,834	$ 22,537

Table D-2:
Distribution of Inactive Lives

The chart reflects the counts and benefits used for valuation purposes as a result of data processing. Please refer to the chart on page 46 for an explanation of the number of annuitants used for valuation purposes.

DROP Members as of June 30, 2022

Age	Number of Persons	Annual Benefits	Average Annual Benefits
<50	6	$ 251,616	$ 41,936
50 to 54	3	134,672	44,891
55 to 59	3	160,663	53,554
60 to 64	1	40,287	40,287
65 to 69	-	-	-
70 to 74	-	-	-
75 to 79	-	-	-
80 to 84	-	-	-
85 to 89	-	-	-
90 and up	-	-	-
Totals	13	$ 587,238	$ 45,172

Terminated Vested Members as of June 30, 2022
Number of Persons

Age	Number
<25	
25 to 29	
30 to 34	4
35 to 39	4
40 to 44	2
45 to 49	5
50 to 54	1
55 to 59	2
60 to 64	1
65 to 69	
70 and above	
Total	19

Table D-3:
Data Reconciliation

The following table shows a reconciliation of the participants used in the previous valuation to this valuation. This chart reflects the counts used for valuation purposes as a result of data processing.

	Active Members*	Terminated Vested Members	Service Retired Members**	Disabled Members	Survivors and Beneficiaries
June 30, 2021 Valuation	226	17	267	24	82
Refunds and Non-Vested Terminations	(9)	(1)	(4)		(6)
Vested Terminations	(2)	2			
Service Retirements	(4)		4		
Disability Retirements					
Deaths			(7)		
New Entrants	27	1	3		7
Rehires					
Other					
June 30, 2022 Valuation	238	19	263	24	83

* Excludes members in DROP
** Includes members in DROP

Comparative Schedules

This section contains tables that summarize the experience of the System shown in present and past valuation reports.

Table E-1 shows a summary of the active members covered as of the various valuation dates.

Table E-2 shows a summary of the retired and inactive members as of the various valuation dates.

Table E-3 summarizes the contribution rates determined by each annual actuarial valuation.

Table E-1:
Active Membership Data

Valuation Date June 30,	Actives	Annual Salaries in Thousands	Average Annual Salary	Average Age	Average Years of Service	Average Hire Age
2022*	252	17,275	68,551	38.6	9.3	29.3
2021*	244	16,631	68,158	38.9	9.6	29.4
2020*	233	15,608	66,986	39.6	10.4	29.2
2019*	232	15,178	65,421	40.2	10.6	29.7
2018*	233	15,251	65,456	39.5	9.9	29.6
2017*	238	14,779	62,097	39.7	9.6	30.0
2016*	228	15,276	67,000	40.2	10.0	30.2
2015	241	14,503	60,176	40.4	10.0	30.4
2014	229	13,901	60,704			
2013	219	13,000	59,362			
2012	218	13,514	61,990			

* Number of actives members includes members in DROP

Table E-2:
Members in Receipt of Annuities and Inactive Membership Data

		All Annuitants					Terminated Members	
Valuation Date June 30,	Number	Annual Benefits in Thousands	Average Annual Benefit	Average Current Age	Average Age at Retirement	Average Service at Retirement	Number Vested Terminated	Number Non-Vested Terminated
2022*	357	13,628	38,175	64.2	50.7	21.5	19	38
2021*	356	13,288	37,325	63.8	50.7	21.5	18	30
2020*	350	12,613	36,036	68.9	50.8	21.6	17	31
2019*	342	11,971	35,002	68.7	50.6	22.0	17	25
2018*	351	12,100	34,474	67.7	50.5	22.0	14	23
2017*	341	11,423	33,497	68.2	50.5	22.1	16	17
2016*	329	10,453	31,772	68.1	50.7	22.8	16	18
2015	327	9,892	30,251	67.6	48.8	22.2	11	13
2014	322	9,336	28,994				11	14
2013	310	8,782	28,329				14	11
2012	305	8,085	26,508				11	10

* Number of members in receipt of annuities excludes members in DROP.

Table E-3:
Contribution Rates

Valuation Date June 30,	Contribution Rates***			Normal Cost Rate*	UAAL Rate**
	Employee	Employer/State	Total		
2022	13.05 %	38.33 %	51.38 %	28.78 %	22.60 %
2021	13.05	38.33	51.38	23.62	27.76
2020	13.05	38.33	51.38	23.61	27.77
2019	13.05	38.33	51.38	24.35	27.03
2018	13.05	38.33	51.38	24.41	26.97
2017	13.05	38.33	51.38	25.09	26.29
2016	13.05	38.33	51.38	25.18	26.20
2015	12.05	38.33	50.38	25.49	24.89
2014	11.05	38.33	49.38	24.69	24.69
2013	10.05	38.33	48.38	25.23	23.15
2012	9.05	38.33	45.38	23.60	21.78

* Includes administrative expenses for the 2014 through 2021 Valuation Dates.
** The UAAL rate is the amount available to amortize the UAAL. It is equal to the total contribution rate, minus the normal cost rate.
*** Rates shown below are for the fiscal year following the valuation date.

The information presented in the required supplementary schedules was determined as part of the actuarial valuation as of June 30, 2022. Additional information as of the latest actuarial valuation follows.

Valuation date	June 30, 2022
Actuarial cost method	Entry Age Normal
Amortization method	Open
Remaining amortization period	30 Years
Asset valuation method	Four-year smoothed market
Actuarial assumptions:	
Investment rate of return*	7.30%
General wage growth*	3.50%
Merit salary increases	1.0% - 6.4%
*Includes inflation	2.75%

Gain and Loss in Accrued Liability During Years Ended June 30 Resulting from Differences Between Assumed Experience and Actual Experience						
	Gain or (Loss) for Year Ending June 30, (expressed in thousands)					
Type of Activity	2017	2018	2019	2020	2021	2022
Investment Income on Actuarial Value of Assets	$ 664	$ (1,129)	$ (678)	$ (893)	$ 4,763	$ 730
Combined Liability Experience	(817)	(2,507)	928	(1,195)	(407)	2,320
(Loss)/Gain During Year from Financial Experience	$ (153)	$ (3,636)	$ 250	$ (2,088)	$ 4,356	$ 3,050
Non-Recurring Items	(7,881)	0	0	0	0	(16,483)
Composite Gain or (Loss) During Year	$ (8,034)	$ (3,636)	$ 250	$ (2,088)	$ 4,356	$ (13,433)

Schedule of Funding Progress (expressed in thousands)						
Valuation Date June 30,	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Funded Ratio	Unfunded AAL (UAAL)	Covered Payroll	UAAL as a Percentage of Covered Payroll
2022	$ 179,361	$ 273,241	66%	$ 93,880	$ 17,275	543%
2021	168,056	252,082	67%	84,025	16,631	505%
2020	158,658	245,915	65%	87,257	15,608	559%
2019	152,851	236,805	65%	83,954	15,178	553%
2018	147,144	229,822	64%	82,678	15,251	542%
2017	141,236	219,470	64%	78,234	14,779	529%

Solvency Test Aggregate Accrued Liabilities for (expressed in thousands)							
Valuation Date June 30,	Active Member Contributions (1)	Retirees & Beneficiaries (2)	Active Member Employer Financed Contributions (3)	Actuarial Value of Reported Assets	Portion of Accrued Liability Covered by Reported Assets (1)	(2)	(3)
2022	$ 15,411	$ 209,648	$ 48,182	$ 179,361	100%	78%	0%
2021	13,982	199,935	38,165	168,056	100%	77%	0%
2020	13,311	196,850	35,754	158,658	100%	74%	0%
2019	13,070	185,306	38,429	152,851	100%	75%	0%
2018	12,976	175,574	41,271	147,144	100%	76%	0%
2017	12,288	163,885	43,297	141,236	100%	79%	0%

The following definitions are largely excerpts from a list adopted in 1981 by the major actuarial organizations in the United States. In some cases the definitions have been modified for specific applicability to the Highway Patrol Officers' Retirement System. Defined terms are capitalized throughout this Appendix.

Accrued Benefit

The amount of an individual's benefit (whether or not vested) as of a specific date, determined in accordance with the terms of a pension plan and based on compensation and service to that date.

Actuarial Accrued Liability

That portion, as determined by a particular Actuarial Cost Method, of the Actuarial Present Value of pension plan benefits and expenses which is not provided for by future Normal Costs.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement, and retirement; changes in compensation, rates of investment earnings, and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; and other relevant items.

Actuarial Cost Method

A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

Actuarial Gains and Losses

A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions during the period between two Actuarial Valuation dates, as determined in accordance with a particular Actuarial Cost Method.

Actuarial Present Value

The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions.

Actuarial Valuation

The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a pension plan.

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an Actuarial Valuation.

Actuarially Equivalent

Of equal Actuarial Present Value, determined as of a given date with each value based on the same set of Actuarial Assumptions.

Amortization Payment

That portion of the pension plan contribution which is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Entry Age Actuarial Cost Method

A method under which the Actuarial Present Value of the Projected Benefits of each individual included in an Actuarial Valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages. The portion of this Actuarial Present Value allocated to a valuation year is called 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 called the Actuarial Accrued Liability.

Market Value of Assets

The fair value of cash, investments and other property belonging to a pension plan that could be acquired by exchanging them on the open market.

Normal Cost

That portion of the Actuarial Present Value of pension plan benefits and expenses which is allocated to a valuation year by the Actuarial Cost Method.

Projected Benefits

Those pension plan benefit amounts which are expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age and past and anticipated future compensation and service credits.

Unaccrued Benefit

The excess of an individual's Projected Benefits over the Accrued Benefits as of a specified date.

Unfunded Actuarial Accrued Liability

The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.