



August 24, 2023

Ms. Bethany Rhodes, Director
Ohio Retirement Study Council
Rhodes State Office Tower
30 East Broad Street, 2nd Floor
Columbus, OH 43215

Dear Ms. Rhodes:

In accordance with Ohio Revised Code Section 5505.12(A), I am attaching the actuarial valuation of the Highway Patrol Retirement System as of December 31, 2022.

If you have any questions, please contact me.

Sincerely,

A handwritten signature in blue ink that reads "Carl Roark".

Carl Roark, Ph.D.
Executive Director
direct dial 614.430.3557
c.roark@ohprs.org

cc: The Honorable Mike DeWine, Governor
The Ohio Retirement Study Council
Director Kimberly Murnieks, Office of Budget and Management
The Honorable Jason Stephens, Speaker of the House
The Honorable Matt Huffman, Senate President
The Honorable Kirk Schuring, Chair, Ohio Retirement Study Council
The Honorable Jean Schmidt, Chair, House Families & Aging
The Honorable Frank Hoagland, Chair, Senate Veterans & Public Safety

OHIO STATE HIGHWAY PATROL RETIREMENT SYSTEM

ACTUARIAL VALUATION
AS OF DECEMBER 31, 2022



FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

August 11, 2023

Board of Trustees
Ohio State Highway Patrol Retirement System
Columbus, Ohio

Dear Board:

We are pleased to present to the Board this report of the December 31, 2022 actuarial valuation of the Ohio State Highway Patrol Retirement System (OHPRS or the System).

The valuation was performed as of December 31, 2022 to determine the current funding status, funding period, the experience of the System over the past year, and provide information and trend data schedules for use in the Annual Financial Report. Use of the results for other purposes may not be applicable and produce significantly different results. Successive valuations will be performed every year.

This report does not include the related results for GASB Statements No. 67 and No. 68. Foster & Foster provided the disclosure information under Statements No. 67 and No. 68 in a separate report dated May 24, 2023. Foster & Foster prepares a separate valuation of OHPRS retiree health care benefits.

Data Sources

In preparing this report, we have relied on personnel, plan design and asset information supplied by OHPRS. In our opinion, the assumptions used in the valuation, as adopted by the Board of Trustees, represent reasonable expectations of anticipated fund experience. While we cannot verify the accuracy of all this information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe that it has produced appropriate results. This information, along with any adjustments or modifications, is summarized in various sections of this report.

Experience

The experience of the System over the last year is outlined in this report. The System experienced an actuarial gain of \$8.9 million, which consists of a \$19.8 million gain on the Fund's actuarial value of assets and a \$10.9 million loss on the System's actuarial accrued liability. Based on the actuarial value of assets, the Fund earned 9.50% compared to the assumed 7.25% return.

Changes Since Prior Report

At the June 2023 Board meeting, the Board of Trustees elected to increase the member contribution rate from 13.00% to 14.00% effective January 1, 2024.

Contribution Amounts

As established by Ohio Revised Code Section 5505.15, the Statutory Employer and Employee contribution rates are set as follows:

Annual Contributions to the Fund (as a % of Active Payroll)		
Employer	Employee	Totals
26.50%	10.00% to 14.00%	36.50% to 40.50%

The funding objective of the Fund is to comply with the amortization requirement of Section 5505.121 of the Revised Code, which requires the retirement board to set a policy with a period of not more than thirty years to amortize the system's unfunded actuarial accrued pension liabilities. If the funding period exceeds 30 years, a plan shall be prepared and submitted by the Board of Trustees to the Ohio retirement study commission (ORSC) to reduce the funding period to not more than 30 years. With the enactment of Senate Bill 345, the Board has the discretion to set the member contribution rate and the Cost of Living Allowance (COLA) percentage to comply with the amortization requirement of Section 5505.121 of the Revised Code.

The results presented in this report are based upon the Board decision at the June 2022 board meeting to adopt a one-time Health Care Fund allocation of \$3.89 million in 2022, and the decision at the June 2023 Board meeting to the adopt the member contribution rate and the COLA increase schedule below:

Calendar Year	COLA	Member Contribution Rate
2021	0.00%	14.00%
2022	3.00%	14.00%
2023	3.00%	13.00%
2024+	0.00%	14.00%

The purpose of this report is to provide information on the results of the December 31, 2022 actuarial valuation based upon these decisions.

Based on the results of this valuation, the unfunded actuarial accrued liabilities of the pension program are expected to be amortized over a 21-year period, so no 30-year funding plan is required.

Schedules for Annual Financial Report

The report includes information and trend data schedules for use in the Annual Financial Report. The following information and exhibits are included in the body of the report and Supplementary Tables section:

- Present Value of Future Benefits
- Membership Note Data
- Participant Statistics
- History of Change in Unfunded Accrued Liability
- History of Annuitants and Survivors Added/Dropped from Rolls
- Summary of Annuitants and Survivors by Age
- Breakdown of Aggregate Accrued Liabilities
- Expected Development of Members contributing to the System

Actuarial Certification

The valuations have been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board, and reflects laws and regulations issued to date pursuant to the provisions of Chapter 5505 of the Ohio Revised Code, as amended by Senate Bill No. 345, as well as applicable federal laws and regulations. The funding percentages and unfunded accrued liability as measured based on the actuarial value of assets will differ from similar measures based on the market value of assets. These measures, as provided, are appropriate for determining the adequacy of future contributions, but may not be appropriate for the purpose of settling a portion or all of its liabilities. Future actuarial measurements may differ significantly from the current measurements presented in this report for a variety of reasons including changes in applicable laws, changes in plan provisions, changes in assumptions, or plan experience differing from expectations. Due to the limited scope of the valuation, we did not perform an analysis of the potential range of such future measurements. Additionally, we used third-party software to model (calculate) the underlying liabilities and costs. These results are reviewed in the aggregate and for individual sample lives. The output from the software is either used directly or input into internally developed models that apply the funding and accounting rules to generate the results. All internally developed models are reviewed as part of the valuation process. As a result of this review, we believe that the models have produced reasonable results. We do not believe there are any material inconsistencies among assumptions or unreasonable output produced due to the aggregation of assumptions.

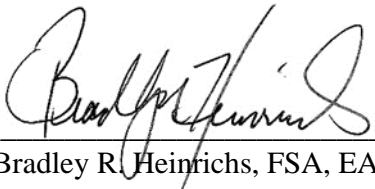
In our opinion, the following valuation results fairly present the financial condition of the Ohio State Highway Patrol Retirement System as of December 31, 2022.

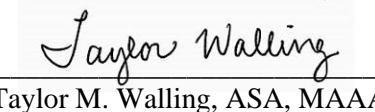
The undersigned is familiar with the immediate and long-term aspects of pension valuations and meets the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All the sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Foster & Foster, Inc. working on this report has any direct financial interest or indirect material interest in the Ohio State Highway Patrol Retirement System, nor does anyone at Foster & Foster, Inc. act as a member of the Board of Trustees of the Ohio State Highway Patrol Retirement System. Thus, there is no relationship existing that might affect our capacity to prepare and certify this actuarial report.

We look forward to discussing the results with you.

Regards,

By: 
Bradley R. Heinrichs, FSA, EA, MAAA

By: 
Taylor M. Walling, ASA, MAAA

Foster & Foster, Inc.

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SUMMARY OF RESULTS

The table below contains a summary of key valuation results compared to the prior year values.

	December 31, 2022	December 31, 2021
Membership Data		
Active Members (Includes DROP members)		
Number	1,380	1,454
Covered Payroll	\$ 112,476,672	\$ 111,621,001
Valuation Payroll	\$ 116,550,531	\$ 115,865,481
Retirees and Beneficiaries		
Number	1,852	1,807
Annual Allowances	\$ 78,364,733	\$ 74,823,557
Vested Former Members		
Number	49	35
Deferred Annual Allowances	\$ 1,950,793	\$ 1,275,475
Inactive Members eligible for Refunds only		
Number	606	631
Contributions Refund Due	\$ 3,861,569	\$ 3,994,087
Funded Status		
Total Actuarial Liability	\$ 1,263,806,590	\$ 1,233,493,873
Actuarial Value of Assets	<u>934,493,628</u>	<u>894,429,665</u>
Unfunded Actuarial Liability	\$ 329,312,962	\$ 339,064,208
Funded Ratio	73.9%	72.5%
Market Value of Assets	\$ 861,142,491	\$ 1,000,315,787
Unfunded Liability (MVA basis)	\$ 402,664,099	\$ 233,178,086
Funded Ratio (MVA basis)	68.1%	81.1%
Funding Period on AVA basis	21 Years	24 Years
Contribution Rates (as a Percentage of Payroll)		
Applicable Fiscal Year	2023	2022
Statutory Contribution Rates:		
Employer	26.50%	26.50%
Member	<u>13.00%</u>	<u>14.00%</u>
Totals	39.50%	40.50%
Allocation of Employer Contribution Rate:		
Pension Contribution Rate:		
Employer Normal Cost	6.87%	6.11%
Unfunded Actuarial Accrued Liabilities	<u>19.63%</u>	<u>17.03%</u>
Total Employer Pension Rate	26.50%	23.14%
Health Care Contribution Rate ¹	<u>0.00%</u>	<u>3.36%</u>
Total Employer Contribution Rate	26.50%	26.50%

¹ Based upon Board action at its June 2022 Board meeting, a one-time Health Care Fund allocation of \$3.89 million was made in calendar year 2022.

ACTUARIAL LIABILITY AND FUNDED RATIO

Below are details regarding the actuarial liability and funded ratio as of December 31, 2022.

1.	Present Value of Future Benefits	\$	1,435,735,955
2.	Active Members Actuarial Liability		
	Retirement	\$	415,246,813
	Termination		7,570,387
	Death & Disability		<u>7,051,030</u>
	Total	\$	429,868,230
3.	Members Receiving Benefits		
	Retirement Annuities	\$	696,401,398
	Disability Annuities		68,042,699
	Survivor Annuities/Children		<u>46,725,366</u>
	Total	\$	811,169,463
4.	Vested Former Members	\$	18,907,327
5.	Contributions Refund Due	\$	3,861,569
6.	Total Actuarial Liability	\$	1,263,806,590
7.	Actuarial Value of Assets	\$	934,493,628
8.	Unfunded Actuarial Liability	\$	329,312,962
9.	Funded Ratio		73.9%

EMPLOYER'S NORMAL COST

Below is a summary of the employer's share of the normal cost for the year beginning January 1, 2023.

Normal Cost	Normal Cost	Percent of Total Payroll
Retirement	\$ 16,519,308	14.17%
Termination	1,882,025	1.61%
Death & Disability	1,957,247	1.68%
Total Normal Cost as of beginning of year	\$ 20,358,580	17.46%
Total Normal Cost (with interest)	\$ 21,096,579	18.10%
Expected Member Contributions	\$ 15,151,569	13.00%
Employer's share of Normal Cost	\$ 5,945,010	5.10%
Expected Administrative Expenses (with interest)	\$ 1,192,844	1.02%
Purchase of Military Service	\$ 874,129	0.75%
Employer's share of Normal Cost, adjusted for expected administrative expenses and purchase of military service	\$ 8,011,983	6.87%
Unfunded Actuarial Accrued Liabilities Amortization Rate		19.63%
Pension Employer Contribution Rate		26.50%
Post-Retirement Health Care	\$ -	0.00%
Total Employer Contribution Rate		26.50%
Valuation Payroll	\$ 116,550,531	

UNFUNDED ACTUARIAL LIABILITY

1. Unfunded Actuarial Accrued Liability (UAAL) as of December 31, 2021	\$	339,064,208
2. Total Normal Cost, Developed as of December 31, 2021		21,642,376
3. Expected Interest (7.25%) on 1. and 2.		26,151,227
4. Contributions		46,976,618
5. Expected Interest (7.25%, mid-year) on 4.		1,673,108
6. Expected UAAL as of December 31, 2022 (1)+(2)+(3)-(4)-(5)		338,208,085
7. Change in UAAL due to actuarial (gain)/loss, by component		
Decrease in UAAL due to investment return higher than assumed		(19,794,133)
Increase in UAAL due to salary increases higher than assumed		7,815,539
Increase in UAAL due to decrement experience		4,183,856
Decrease in UAAL due to inactive mortality experience		(876,461)
Decrease in UAAL due to other changes		<u>(256,441)</u>
Net decrease in UAAL due to actuarial experience		(8,927,640)
8. Change in UAAL due to assumption changes		-
9. Change in UAAL due to benefit changes		32,517
10. Unfunded Actuarial Accrued Liability as of December 31, 2022	\$	329,312,962

ANALYSIS OF PLAN EXPERIENCE

Below is the detail analysis of Gains and Losses due to plan experience resulting in differences between Assumed and Actual Experience.

Type of Activity	(Gain) or Loss for Year Ended 12/31	
	2022	2021
Age & Service Retirements. If members retire at older ages or with lower final average pay than assumed, there is a gain. If younger ages or higher average pays, a loss.	\$ 3,880,308	\$ 5,993,377
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	2,059,179	817,112
Death-in-Service Benefits. If more liabilities are released by death-in-service claims than assumed, there is a gain. If smaller releases, a loss.	296,429	(914,311)
Withdrawal From Employment. If more liabilities are released by withdrawals than assumed, there is a gain. If smaller releases, a loss.	(2,052,060)	(4,598,289)
Salary Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	7,815,539	(4,141,467)
Investment Return. If there is greater investment return on pension assets than assumed, there is a gain. If less return, a loss.	(19,794,133)	(33,827,426)
Inactive Mortality Experience. If more deaths occur than assumed, there is a gain. If fewer deaths than assumed, there is a loss.	(876,461)	1,112,614
Other Changes. Miscellaneous gains and losses resulting from data adjustments, timing of financial transactions, valuation methods, DROP account interest crediting, etc.	(256,441)	2,070,445
(Gain) or Loss During Year from Experience	(\$ 8,927,640)	(\$ 33,487,944)
Non-Recurring Items Effect of Assumption Changes/Method Changes/Benefit Changes	32,517	10,743,723
Composite (Gain) or Loss During Year	(\$ 8,895,123)	(\$ 22,744,221)

CHANGE IN FUNDED RATIO

1. Funded ratio as of December 31, 2021	72.5%
2. Expected funded ratio as of December 31, 2022	73.0%
3. Change in funded ratio due to actuarial (gain)/loss, by component	
Increase in funded ratio due to investment return higher than assumed	1.6%
Decrease in funded ratio due to salary increases higher than assumed	-0.5%
Decrease in funded ratio due to decrement experience	-0.2%
Increase in funded ratio due to inactive mortality experience	0.0%
Increase in funded ratio due to other changes	<u>0.0%</u>
Net increase in funded ratio due to actuarial experience	0.9%
4. Change in UAAL due to assumption changes	0.0%
5. Change in UAAL due to the benefit changes	0.0%
6. Funded Ratio as of December 31, 2022	73.9%

UNFUNDED ACTUARIAL ACCRUED LIABILITY

FUNDING PERIOD

Below is the schedule illustrating the Amortization of the Total Unfunded Actuarial Accrued Liability as of December 31, 2022.

Year	Projected Unfunded Actuarial Accrued Liability at Beginning of the Year	Assumed Amortization Contribution Rate ¹	Assumed Payroll 3.00% Growth Rate	Mid-Year Amortization Contribution Amount	Projected Unfunded Actuarial Accrued Liability at End of the Year
1	\$ 329,312,962	19.63%	\$ 116,550,531	\$ 22,878,869	\$ 329,494,434
2	329,494,434	20.64%	120,047,047	24,777,711	327,722,592
3	327,722,592	20.67%	123,648,458	25,558,136	325,014,072
4	325,014,072	20.69%	127,357,912	26,350,352	321,288,752
5	321,288,752	20.71%	131,178,649	27,167,098	316,447,512
6	316,447,512	20.74%	135,114,008	28,022,645	310,369,264
7	310,369,264	20.77%	139,167,428	28,905,075	302,936,484
8	302,936,484	20.77%	143,342,451	29,772,227	294,066,792
9	294,066,792	20.77%	147,642,725	30,665,394	283,629,069
10	283,629,069	20.77%	152,072,007	31,585,356	271,481,884
11	271,481,884	20.77%	156,634,167	32,532,916	257,472,720
12	257,472,720	20.79%	161,333,192	33,541,171	241,403,727
13	241,403,727	20.80%	166,173,188	34,564,023	223,110,450
14	223,110,450	20.81%	171,158,384	35,618,060	202,399,333
15	202,399,333	20.82%	176,293,136	36,704,231	179,061,805
16	179,061,805	20.82%	181,581,930	37,805,358	152,891,961
17	152,891,961	20.81%	187,029,388	38,920,816	123,669,618
18	123,669,618	20.80%	192,640,270	40,069,176	91,139,395
19	91,139,395	20.78%	198,419,478	41,231,568	55,046,940
20	55,046,940	20.75%	204,372,062	42,407,203	15,120,275
21	15,120,275	20.70%	210,503,224	15,658,795	0

Funding Period = 21 Years

1. The amortization contribution rate is the total statutory contribution rate, minus the total normal cost rate, minus the health care contribution rate. The statutory contribution rate is assumed to remain unchanged except for any legislated increases. The administrative expense is projected to increase at the assumed inflation rate of 2.50% per year. The impact of House Bill 362 and Funding Policy adopted by OHPRS as approved at its April 2022 Board meeting is reflected in the above.

DEVELOPMENT OF ASSETS

Development of Investment Gain/(Loss)

Market Value of Assets, 12/31/2021	\$ 1,130,444,517
Contributions Less Benefit Payments & Admin Expenses	(45,155,674)
Expected Investment Earnings for 2022	80,320,334
Expected Market Value of Assets, 12/31/2022	<u>\$ 1,165,609,177</u>
Actual Net Investment Income/(Loss) for 2022	\$ (109,010,556)
2022 Investment Gain/(Loss), (Actual less Expected)	\$ (189,330,890)

Development of Actuarial Value of Assets

Plan Year Ending	Gain/(Loss)	Gains/(Losses) Not Yet Recognized by Valuation Year		
		2022	2023	2024
12/31/2019	89,868,756	0	0	0
12/31/2020	71,468,544	17,867,136	0	0
12/31/2021	81,945,517	40,972,758	20,486,379	0
12/31/2022	(189,330,890)	<u>(141,998,167)</u>	<u>(94,665,445)</u>	<u>(47,332,722)</u>
Total		(83,158,273)	(74,179,066)	(47,332,722)

Market Value of Assets, 12/31/2022	\$ 976,278,287
Less: Unrecognized Amounts as of 12/31/2022	<u>(83,158,273)</u>
Preliminary Actuarial Value of Assets, 12/31/2022	\$ 1,059,436,560
Corridor Percent	20%
Upper Corridor Limit	1,171,533,944
Lower Corridor Limit	781,022,629
Actuarial Value of Assets, 12/31/2022	\$ 1,059,436,560

Calculation of Rates of Return

Rates of return calculated below are based on a formula defined by the IRS. Therefore, the returns may differ from investment returns calculated for other purposes. The formula is defined as $(2 * I)$ divided by $(A + B - I)$ where A, B and I are as follows:

(A) 12/31/2021 Actuarial Assets:	\$ 1,010,783,918
(I) Net Investment Income:	
1. Interest, Dividends, & Realized/Unrealized Gain/Loss (net of investment expenses)	(109,010,556)
2. Change in Actuarial Value	202,818,872
Total	<u>\$ 93,808,316</u>
(B) 12/31/2022 Actuarial Assets:	\$ 1,059,436,560
Actuarial Asset Rate of Return = $2I/(A+B-I)$:	9.5%
Market Value of Assets Rate of Return:	-9.8%
12/31/2022 Limited Actuarial Assets:	1,059,436,560

STATEMENT OF FIDUCIARY NET POSITION
 December 31, 2022

	MARKET VALUE		TOTAL
	PENSION	HEALTH	
<u>ASSETS</u>			
Cash and Cash Equivalents:			
Cash and Short Term Investments	47,371,628	6,331,612	53,703,240
Total Cash and Equivalents	47,371,628	6,331,612	53,703,240
Receivables:			
Employer Contributions Receivable	649,729	0	649,729
Member Contributions Receivable	1,695,180	0	1,695,180
Accrued Investment Income	2,787,392	372,558	3,159,950
Health Care Receivable	0	436,169	436,169
Miscellaneous Receivable	37,600	0	37,600
Total Receivables	5,169,901	808,727	5,978,628
Investments:			
Domestic Equity	180,073,632	23,920,986	203,994,618
International Equity	48,224,814	6,405,751	54,630,565
Fixed Income	71,596,115	9,510,184	81,106,299
Real Estate	75,181,314	9,986,410	85,167,724
Private Equity	193,730,298	25,893,665	219,623,963
Hedge Funds	61,696,004	8,246,184	69,942,188
Direct Infrastructure	15,485,233	2,069,730	17,554,963
Global Equity	175,016,387	23,392,396	198,408,783
Total Investments	821,003,797	109,425,306	930,429,103
Other	147,114	147,554	294,668
Total Assets	873,692,440	116,713,199	990,405,639
Deferred Outflows of Resources	196,537	1,683	198,220
<u>LIABILITIES</u>			
Payables:			
Accounts Payable	211,498	28,268	239,766
Accrued Payroll Liabilities	299,905	40,085	339,990
Accrued Pension Liabilities	11,401,641	0	11,401,641
Accrued Health Care Liabilities	0	1,354,177	1,354,177
Net Pension Liability	338,359	0	338,359
Net OPEB Liability	0	0	0
Total Liabilities	12,251,403	1,422,530	13,673,933
Deferred Inflows of Resources	495,083	156,556	651,639
Net Assets:			
Active and Retired Members' Equity	861,142,491	115,135,796	976,278,287
Employees' Savings Fund			134,668,614
Employer Accumulation Fund			115,135,796
Pension Reserve Fund			726,473,877
Survivors Benefit Fund			0
Health Care Fund			115,135,796
Income Fund			(115,135,796)
Total Fund Balance			976,278,287
NET POSITION			976,278,287

STATEMENT OF CHANGES IN FIDUCIARY NET POSITION
 FOR THE YEAR ENDED December 31, 2022
 Market Value Basis

	PENSION	HEALTH	TOTAL
<u>ADDITIONS</u>			
Contributions:			
Member Contribution	17,361,370	2,415,723	19,777,093
Employer Contributions	28,972,464	3,890,000	32,862,464
Medicare Reimbursement		1,633,742	1,633,742
Transfers	642,784		642,784
Total Contributions	46,976,618	7,939,465	54,916,083
Net Investment Income ¹	(96,156,340)	(12,854,216)	(109,010,556)
Total Additions	(49,179,722)	(4,914,751)	(54,094,473)
<u>DEDUCTIONS</u>			
Distributions to Members:			
Benefit Payments	84,707,194	9,900,250	94,607,444
Refund of Member Contributions	3,785,126		3,785,126
Death Benefit	170,000		170,000
Total Distributions	88,662,320	9,900,250	98,562,570
Administrative Expenses	1,331,254	177,933.0	1,509,187
Total Deductions	89,993,574	10,078,183	100,071,757
Net Increase in Net Position	(139,173,296)	(14,992,934)	(154,166,230)
<u>NET POSITION</u>			
Beginning of the Year	1,000,315,787	130,128,730	1,130,444,517
End of the Year	861,142,491	115,135,796	976,278,287
Actuarial Value End of Year ²	934,493,628	124,942,932	1,059,436,560

¹ Investment related expenses include investment management, investment consulting, custodial and securities lending bank fees.

² Actuarial Value is allocated in proportion to the Market Value

PARTICIPANT DATA

Participant Information	December 31, 2022	December 31, 2021	Change
Number Total Active Members	1,380	1,454	-5.1%
Number Active DROP Members	144	131	9.9%
Number Receiving Benefits			
Retirement Annuities	1,382	1,350	2.4%
Surviving Annuities	312	304	2.6%
Disability Annuities	158	153	3.3%
Number Inactive Members - Vested	49	35	40.0%
Total Members	3,281	3,296	-0.5%
Active Statistics – Total			
Number	1,380	1,454	-5.1%
Average Age	39.1	39.1	0.0%
Average Service	13.9	13.8	0.4%
Covered Payroll	\$ 112,476,672	\$ 111,621,001	0.8%
Average Payroll	\$ 81,505	\$ 76,768	6.2%
Active Statistics – DROP Members			
Number	144	131	9.9%
Average Age	52.7	52.7	-0.1%
Average Service	26.8	27.1	-0.9%
Average Age at DROP	50.2	50.0	0.4%
Average Service at DROP	24.3	24.3	0.1%
Covered Payroll	\$ 14,107,538	\$ 12,160,998	16.0%
Average Payroll	\$ 97,969	\$ 92,832	5.5%
Annual Benefit Payments for Members			
Receiving Benefits			
Retirement Annuities	\$ 66,477,315	\$ 63,630,149	4.5%
Surviving Annuities	\$ 5,890,491	\$ 5,547,025	6.2%
Disability Annuities	\$ 5,996,927	\$ 5,646,383	6.2%

Participant Reconciliation

	Active	Active DROP	Inactive Vested	Retiree	Survivors	Disabled	Total Count
<i>As of 12/31/2021</i>	<i>1,323</i>	<i>131</i>	<i>35</i>	<i>1,350</i>	<i>304</i>	<i>153</i>	<i>3,296</i>
DROPs In	(54)	54					0
Terminations							
Vested	(16)		16				0
Not Vested	(45)						(45)
Retirements	(22)	(40)	(2)	64			0
Disabled	(8)	(1)				9	0
Deaths							
w/o Beneficiary				(11)	(16)	(1)	(28)
w/ Beneficiary				(21)	26	(3)	2
New Member	53						53
Return to Work	5						5
Benefit Expired					(2)		(2)
Adjustments	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Net Change	(87)	13	14	32	8	5	(15)
<i>As of 12/31/2022</i>	<i>1,236</i>	<i>144</i>	<i>49</i>	<i>1,382</i>	<i>312</i>	<i>158</i>	<i>3,281</i>

Active Member Statistics

DROP Status	Sex	Count	Avg Age	Avg Svc	Covered Payroll	
					Total	Average
Not Yet in DROP	M	1,135	37.7	12.5	90,529,255	79,761
	F	<u>101</u>	36.5	11.1	<u>7,839,879</u>	77,623
	Total	1,236	37.6	12.4	98,369,134	79,587
In DROP	M	135	52.7	26.9	13,281,206	98,379
	F	<u>9</u>	52.6	25.7	<u>826,332</u>	91,815
	Total	144	52.7	26.8	14,107,538	97,969
Total	M	1,270	39.3	14.0	103,810,461	81,741
	F	<u>110</u>	37.8	12.3	<u>8,666,211</u>	78,784
	Total	1,380	39.1	13.9	112,476,672	81,505

Active Age Service Grid - Total

Total Active Member Count and Covered Payroll by Age and Service

Age	Years of Service									Total
	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	
<25	37 \$28,692	35 \$56,460								72 \$42,190
25-29	11 \$28,944	110 \$64,896	92 \$76,704							213 \$68,139
30-34	6 \$24,534	36 \$65,031	116 \$76,250	73 \$82,940						231 \$75,273
35-39		12 \$67,416	45 \$77,624	86 \$83,583	35 \$88,136					178 \$81,882
40-44		1 \$81,509	10 \$80,094	43 \$82,421	118 \$89,824	73 \$94,535	2 \$91,406			247 \$89,513
45-49				9 \$83,881	45 \$87,567	135 \$92,268	55 \$98,401	3 \$94,462		247 \$92,498
50-54					20 \$83,268	60 \$88,403	58 \$99,893	21 \$103,467	1 \$119,331	160 \$94,097
55-59				1 \$92,589		7 \$86,949	12 \$94,575	12 \$92,837		32 \$92,193
60-64										
65-69										
70+										
Total	54 \$28,281	194 \$63,641	263 \$76,790	212 \$83,181	218 \$88,486	275 \$91,891	127 \$98,610	36 \$99,173	1 \$119,331	1,380 \$81,505

Active Age Service Grid – DROP Members

Active DROP Member Count and Covered Payroll by Age and Service

Age	Years of Service								Total	
	<1	1-4	5-9	10-14	15-19	20-24	25-29	30-34		35+
<25										
25-29										
30-34										
35-39										
40-44										
45-49							26	3		29
							\$102,755	\$94,462		\$101,898
50-54						17	46	21	1	85
						\$84,412	\$101,317	\$103,467	\$119,331	\$98,679
55-59						6	12	12		30
						\$85,971	\$94,575	\$92,837		\$92,159
60-64										
65-69										
70+										
Total						23	84	36	1	144
						\$84,818	\$100,799	\$99,173	\$119,331	\$97,969

Annuitant Statistics

Retirement Annuities

Sex	Count	Avg Age	Total Annuity	Average Annuity
M	1,313	67.9	63,436,159	48,314
F	<u>69</u>	58.4	<u>3,041,156</u>	44,075
Total	1,382	67.4	66,477,315	48,102

Survivor Annuities

Sex	Count	Avg Age	Total Annuity	Average
M	13	25.9	53,175	4,090
F	<u>299</u>	72.6	<u>5,837,316</u>	19,523
Total	312	70.7	5,890,491	18,880

Disability Retirement Annuities

Sex	Count	Avg Age	Total Annuity	Average
M	135	56.8	5,136,486	38,048
F	<u>23</u>	54.2	<u>860,441</u>	37,410
Total	158	56.4	5,996,927	37,955

Deferred Annuities

Sex	Count	Avg Age	Total Annuity	Average
M	42	47.7	1,669,874	39,759
F	<u>7</u>	49.3	<u>280,919</u>	40,131
Total	49	47.9	1,950,793	39,812

Distribution of Retirement Annuities by Age

	Male			Female			Total		
	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities
x < 45	0	0	0	0	0	0	0	0	0
45 <= x < 50	21	1,107,761	52,751	1	47,832	47,832	22	1,155,593	52,527
50 <= x < 55	149	7,074,865	47,482	23	974,241	42,358	172	8,049,106	46,797
55 <= x < 60	184	8,348,896	45,374	20	887,945	44,397	204	9,236,841	45,279
60 <= x < 65	208	10,221,657	49,143	17	785,409	46,201	225	11,007,066	48,920
65 <= x < 70	167	8,819,164	52,809	5	231,981	46,396	172	9,051,145	52,623
70 <= x < 75	202	10,341,163	51,194	2	78,912	39,456	204	10,420,075	51,079
75 <= x < 80	216	10,507,818	48,647	1	34,836	34,836	217	10,542,654	48,584
80 <= x < 85	109	4,867,074	44,652	0	0	0	109	4,867,074	44,652
85 <= x < 90	36	1,442,339	40,065	0	0	0	36	1,442,339	40,065
90 <= x	21	705,422	33,592	0	0	0	21	705,422	33,592
Total	1,313	63,436,159	48,314	69	3,041,156	44,075	1,382	66,477,315	48,102

Distribution of Survivor Annuities by Age

	Male			Female			Total		
	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities
x < 20	8	14,400	1,800	14	25,200	1,800	22	39,600	1,800
20 <= x < 25	2	4,118	2,059	4	7,200	1,800	6	11,318	1,886
25 <= x < 30	0	0	0	1	11,259	11,259	1	11,259	11,259
30 <= x < 35	0	0	0	0	0	0	0	0	0
35 <= x < 40	1	10,935	10,935	2	37,482	18,741	3	48,417	16,139
40 <= x < 45	0	0	0	3	27,288	9,096	3	27,288	9,096
45 <= x < 50	0	0	0	7	105,644	15,092	7	105,644	15,092
50 <= x < 55	0	0	0	10	177,543	17,754	10	177,543	17,754
55 <= x < 60	1	20,756	20,756	7	165,252	23,607	8	186,008	23,251
60 <= x < 65	1	2,966	2,966	15	331,810	22,121	16	334,776	20,924
65 <= x < 70	0	0	0	22	484,720	22,033	22	484,720	22,033
70 <= x < 75	0	0	0	41	924,555	22,550	41	924,555	22,550
75 <= x < 80	0	0	0	54	1,200,459	22,231	54	1,200,459	22,231
80 <= x < 85	0	0	0	48	1,059,748	22,078	48	1,059,748	22,078
85 <= x < 90	0	0	0	31	593,158	19,134	31	593,158	19,134
90 <= x	0	0	0	40	685,998	17,150	40	685,998	17,150
Total	13	53,175	4,090	299	5,837,316	19,523	312	5,890,491	18,880

Distribution of Disability Annuities by Age

	Male			Female			Total		
	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities
x < 20	0	0	0	0	0	0	0	0	0
20 <= x < 25	0	0	0	0	0	0	0	0	0
25 <= x < 30	2	60,536	30,268	0	0	0	2	60,536	30,268
30 <= x < 35	3	115,718	38,573	0	0	0	3	115,718	38,573
35 <= x < 40	6	189,240	31,540	0	0	0	6	189,240	31,540
40 <= x < 45	8	299,054	37,382	4	146,586	36,647	12	445,640	37,137
45 <= x < 50	15	590,036	39,336	2	73,161	36,581	17	663,197	39,012
50 <= x < 55	31	1,159,464	37,402	6	240,881	40,147	37	1,400,345	37,847
55 <= x < 60	17	622,337	36,608	7	270,299	38,614	24	892,636	37,193
60 <= x < 65	19	822,103	43,269	4	129,514	32,379	23	951,617	41,375
65 <= x < 70	13	538,922	41,456	0	0	0	13	538,922	41,456
70 <= x < 75	13	456,129	35,087	0	0	0	13	456,129	35,087
75 <= x < 80	7	241,047	34,435	0	0	0	7	241,047	34,435
80 <= x < 85	0	0	0	0	0	0	0	0	0
85 <= x < 90	1	41,900	41,900	0	0	0	1	41,900	41,900
90 <= x	0	0	0	0	0	0	0	0	0
Total	135	5,136,486	38,048	23	860,441	37,410	158	5,996,927	37,955

Distribution of Deferred Annuities by Age

	Male			Female			Total		
	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities	Count	Total Annuities	Average Annuities
x < 40	1	16,857	16,857	0	0	0	1	16,857	16,857
40 <= x < 45	8	340,711	42,589	0	0	0	8	340,711	42,589
45 <= x < 50	26	1,146,107	44,081	4	170,024	42,506	30	1,316,131	43,871
50 <= x < 55	6	137,642	22,940	3	110,895	36,965	9	248,537	27,615
55 <= x < 60	0	0	0	0	0	0	0	0	0
60 <= x < 65	0	0	0	0	0	0	0	-	0
65 <= x < 70	1	28,557	28,557	0	0	0	1	28,557	28,557
70 <= x	0	0	0	0	0	0	0	0	0
Total	42	1,669,874	39,759	7	280,919	40,131	49	1,950,793	39,812

ACTUARIAL ASSUMPTIONS AND METHODS

Below is a summary of the actuarial assumptions for the December 31, 2022 valuation. An experience study was performed in May of 2020 based on data for the period December 31, 2013 through December 31, 2018. The assumptions below are based on the experience study and were adopted effective December 31, 2019.

Interest Rate	7.25% (net of investment-related expenses)
Mortality Rates	<i>Healthy Active Lives:</i> PubS-2010 (amount-weighted) employee tables. <i>Retiree and Vested Terminated Lives:</i> PubS-2010 (amount-weighted) healthy retiree tables adjusted by 94%. <i>Contingent Survivor Lives:</i> PubS-2010 (amount-weighted, above-median) contingent survivor tables adjusted by 105%. <i>Disabled Lives:</i> PubS-2010 (amount-weighted) disabled retiree tables. The mortality assumptions for all participants are sex distinct with mortality improvement projected five years beyond the valuation date using most recent projection scale (currently scale MP-2021) and a base year of 2010. We feel these assumptions sufficiently accommodate anticipated future mortality improvements.
Cost-of-Living Adjustment	0.00% for calendar year 2021; 3.00% for calendar year 2022 & 2023 and then 0.00% thereafter.
Inflation	2.50%
Salary Increases	See Table 1 later in this section.
Retirement Rates	See Table 2 later in this section.
Termination Rates	See Table 3 later in this section.
Disability Rates	See Table 4 later in this section.
Percent Married	80%

Spousal Age Difference	Spouse of male member assumed to be 3 years younger than member; Spouse of female member assumed to be 3 years older than member.
Purchasing Military Service Load	0.75% of payroll is included in pension normal cost calculations.
Dependent Children	Members who receive a death-in-service benefit are assumed to have two children for whom benefits are paid for 10 years.
Contribution Rates	Members – 14.00% in year 2022, 13.0% in year 2023 and 14.0% in year 2024 and later. State – 26.50%
Actuarial Cost Method	Entry Age Normal, with costs allocated on basis of earnings. Actuarial gains and losses are reflected in the unfunded actuarial liability.
Actuarial Asset Method	Market value of assets adjusted by the unrecognized investment gains and losses for each of the four years prior to the valuation date. Gains and losses are recognized at a rate of 25% per year. Actuarial Assets shall not be less than 80% nor greater than 120% of Market Value of Assets.
Payroll Growth	3.00% for purposes of amortizing the Unfunded Actuarial Accrued Liability.
Administrative Expenses	\$ 1,151,116 annually, based on the average of actual expenses incurred in the prior two fiscal years and then increases based on 2.5% inflation rate annually.
DROP Duration	5 years.
DROP Election	15% of active members eligible for unreduced retirement/DROP do not enter the DROP or retire in any given year prior to age 60.
Source of Data	Data and audited financial information is provided by the Fund.
Valuation Date	December 31, 2022.

Changes in Funding Assumptions/Methods Since the Prior Valuation

There have been no changes of methods since the prior valuation.

The valuation reflects an increase in the member contribution rate to 14.0% effective January 1, 2024.

Table 1 – Salary Increase Rates

Service	Salary Increase Rate
0	13.50%
1	13.50%
2	9.50%
3	9.50%
4	8.00%
5	8.00%
6-11	5.00%
12+	3.80%

Table 2 – Retirement Rates

Age	Normal Retirement Rate	Early Retirement Rate
48	20%	5%
49-50	15%	5%
51	15%	10%
52	20%	
53	10%	
54	20%	
55	30%	
56-59	40%	
60+	100%	

Table 3 – Termination Rates

Service	Termination Rate
0	13.00%
1-2	6.50%
3-5	4.50%
6-9	2.50%
10-20	1.00%
21+	2.50%

Table 4 – Disability Rates (Sample Rates)

Age	Disability Rates
20	0.06%
25	0.06%
30	0.17%
35	0.32%
40	0.53%
45	0.64%
50	0.85%
55	1.00%
60	0.00%

55% of disabilities assumed to be service-incurred.

GLOSSARY

Actuarial Value of Assets is the asset value used in the valuation to determine contribution requirements. It represents the plan's Market Value of Assets (see below), with adjustments according to the plan's Actuarial Asset Method. These adjustments produce a "smoothed" value that is likely to be less volatile from year to year than the Market Value of Assets.

Covered Payroll is the annualized pensionable salary earned during the year ended on the valuation date.

Entry Age Normal Cost Method - Under this method, the normal cost is the sum of the individual normal costs for all active participants. For an active participant, the normal cost is the participant's normal cost accrual rate, multiplied by the participant's current compensation.

- (a) The normal cost accrual rate equals:
 - (i) the present value of future benefits for the participant, determined as of the participant's entry age, divided by
 - (ii) the present value of the compensation expected to be paid to the participant for each year of the participant's anticipated future service, determined as of the participant's entry age.
- (b) In calculating the present value of future compensation, the salary scale is applied both retrospectively and prospectively to estimate compensation in years prior to and subsequent to the valuation year based on the compensation used for the valuation.
- (c) The accrued liability is the sum of the individual accrued liabilities for all participants and beneficiaries. A participant's accrued liability equals the present value, at the participant's attained age, of future benefits less the present value at the participant's attained age of the individual normal costs payable in the future. A beneficiary's accrued liability equals the present value, at the beneficiary's attained age, of future benefits. The unfunded accrued liability equals the total accrued liability less the actuarial value of assets.
- (d) Under this method, the entry age used for each active participant is the participant's age at the time he or she would have commenced participation if the plan had always been in existence under current terms, or the age as of which he or she first earns service credits for purposes of benefit accrual under the current terms of the plan.

Market Value of Assets is the fair market value of plan assets as of the valuation date. This amount may be adjusted to produce an Actuarial Value of Assets for plan funding purposes.

Normal (Current Year's) Cost is the current year's cost for benefits yet to be funded. Under the Entry Age Normal cost method, it is determined for each participant as the present value of future benefits, determined as of the Member's entry age, amortized as a level percentage of compensation over the anticipated number of years of participation, determined as of the entry age.

Present Value of Benefits is the single sum value on the valuation date of all future benefits to be paid to current plan participants.

Unfunded Actuarial Accrued Liability (UAAL) is the difference between the actuarial accrued liability (described above) and the Actuarial Value of Assets. Under the Entry Age Normal Actuarial Cost Method, an actuarial gain or loss, based on actual versus expected UAAL, is determined in conjunction with each valuation of the plan.

Valuation Payroll is the projected annual pensionable salary starting on the valuation date of all active participants who are not subject to a 100% probability of retirement on the valuation date.

Actuarial Determined Contribution (ADC) is the level of employer contribution effort that would be required on a sustained, ongoing basis to:

- (a) fund the normal cost (cost associated with new service received) each year and
- (b) amortize the total unfunded actuarial accrued liability (or funding excess) attributed to past services over a funding period, which is no more than thirty years.

DISCUSSION OF RISK

ASOP No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions, states that the actuary should identify risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition.

Throughout this report, actuarial results are determined under various assumption scenarios. These results are based on the premise that all future plan experience will align with the plan's actuarial assumptions; however, there is no guarantee that actual plan experience will align with the plan's assumptions. It is possible that actual plan experience will differ from anticipated experience in an unfavorable manner that will negatively impact the plan's funded position.

Below are examples of ways in which plan experience can deviate from assumptions and the potential impact of that deviation. Typically, this results in an actuarial gain or loss representing the current year financial impact on the plan's unfunded liability of the experience differing from assumptions; this gain or loss is amortized over a period of time determined by the plan's amortization method. When assumptions are selected that adequately reflect plan experience, gains and losses typically offset one another in the long term, resulting in a relatively low impact on the plan's amortization period. When assumptions are too optimistic, losses can accumulate over time and the plan's amortization period could potentially grow to an unmanageable level.

- **Investment Return:** When the rate of return on the Actuarial Value of Assets falls short of the assumption, this produces a loss representing assumed investment earnings that were not realized. Further, it is unlikely that the plan will experience a scenario that matches the assumed return in each year as capital markets can be volatile from year to year. Therefore, amortization periods can vary in the future.
- **Salary Increases:** When a plan participant experiences a salary increase that was greater than assumed, this produces a loss representing the cost of an increase in anticipated plan benefits for the participant as compared to the previous year. The total gain or loss associated with salary increases for the plan is the sum of salary gains and losses for all active participants.
- **Payroll Growth:** The plan's payroll growth assumption, if one is used, causes a predictable annual increase in the plan's amortization payment in order to produce an amortization payment that remains constant as a percentage of payroll if all assumptions are realized. If payroll does not increase according to the plan's payroll growth assumption, the plan's amortization period can increase significantly even if all assumptions other than the payroll growth assumption are realized since anticipated contribution rely upon membership payroll.
- **Demographic Assumptions:** Actuarial results take into account various potential events that could happen to a plan participant, such as retirement, termination, disability, and death. Each of these potential events is assigned a liability based on the likelihood of the event and the financial consequence of the event for the plan. Accordingly, actuarial liabilities reflect a blend of financial consequences associated with various possible outcomes (such as retirement at one of various possible ages). Once the outcome is known (e.g. the participant retires) the liability is adjusted to reflect the known outcome. This adjustment produces a gain or loss depending on whether the outcome was more or less favorable than other outcomes that could have occurred.

- **Amortization Period:** Risks associated with the items outlined above will inherently create varying liabilities and assets resulting in volatility in the amortization period. Actuarial losses on assets and liabilities will lead to longer amortization periods, while actuarial gains on assets and liabilities will lead to shorter amortization periods.
- **Contribution Risk:** This risk results from the potential that the total annual contributions, based on fixed-rates for the State and membership, may deviate from actuarially determined contributions. The actuarially determined contributions are adjusted in conjunction with each actuarial valuation to take into account the deviation in actual versus expected experience between valuation dates. Fixed-rate contribution structures include the risk that scheduled contributions do not reflect the actual cost of plan benefits, meaning that in order to maintain actuarially sound funding levels, contribution rate increases, or benefit reductions may be required.

Impact of Plan Maturity on Risk

For newer pension plans, most of the participants and associated liabilities are related to active members who have not yet reached retirement age. As pension plans continue in operation and active members reach retirement ages, liabilities begin to shift from being primarily related to active members to being shared amongst active and retired members. Plan maturity is a measure of the extent to which this shift has occurred. It is important to understand that plan maturity can have an impact on risk tolerance and the overall risk characteristics of the plan. For example, plans with a large amount of retired liability do not have as long of a time horizon to recover from losses (such as losses on investments due to lower than expected investment returns) as plans where the majority of the liability is attributable to active members. For this reason, less tolerance for investment risk may be warranted for highly mature plans with a substantial inactive liability. Similarly, mature plans paying substantial retirement benefits resulting in a small positive or net negative cash flow can be more sensitive to near term investment volatility, particularly if the size of the fund is shrinking, which can result in less assets being available for investment in the market.

To assist with determining the maturity of the Fund, we have provided some relevant metrics in the table following titled “Fund Maturity Measures and Other Risk Metrics”. Highlights of this information are discussed below:

- The Support Ratio, determined as the ratio of active to inactive members, has decreased from 108.9% on December 31, 2012 to 72.6% as of December 31, 2022, indicating that the plan has been maturing during the period.
- The Accrued Liability Ratio, determined as the ratio of the Inactive Accrued Liability, which is the liability associated with members who are no longer employed but are due a benefit from the Fund, to the Total Accrued Liability, is 65.7%. With a plan of this maturity, losses due to lower than expected investment returns or demographic factors must be made up over a shorter time horizon than would be needed for a less mature plan.
- The Funded Ratio, determined as the ratio of the Actuarial Value of Assets to the Total Accrued Liability, has increased from 68.1% on December 31, 2012 to 73.9% on December 31, 2022.

- The Net Cash Flow Ratio, determined as the ratio of the Net Cash Flow (contributions minus benefit payments and administrative expenses) to the Market Value of Assets, is around -5.1% to -3.8%. A Net Cash Flow Ratio in this range indicates that contributions are not sufficient to cover the Fund's benefit payments and administrative expenses.

It is important to note that the actuary has identified the risks above as the most significant risks based on the characteristics of the Fund and the nature of the project, however, it is not an exhaustive list of potential risks that could be considered. Additional advanced modeling, as well as the identification of additional risks, can be provided at the request of the audience addressed in the cover letter of this report.

Fund Maturity Measures and Other Risk Metrics

	12/31/2022	12/31/2021	12/31/2017	12/30/2012
<u>Support Ratio</u>				
Total Actives	1,380	1,454	1,650	1,645
Total Inactives	1,901	1,842	1,648	1,511
Actives / Inactives	72.6%	78.9%	100.1%	108.9%
<u>Asset Volatility Ratio</u>				
Market Value of Assets (MVA)	861,142,491	1,000,315,787	786,356,140	642,644,347
Total Covered Payroll	112,476,672	111,621,001	112,705,188	98,117,403
MVA / Total Covered Payroll	765.6%	896.2%	697.7%	655.0%
<u>Accrued Liability (AL) Ratio</u>				
Inactive Accrued Liability	830,076,790	797,843,018	717,621,283	586,311,106
Total Accrued Liability	1,263,806,590	1,233,493,873	1,153,619,256	966,310,485
Inactive AL / Total AL	65.7%	64.7%	62.2%	60.7%
<u>Funded Ratio</u>				
Actuarial Value of Assets (AVA)	934,493,628	894,429,665	774,670,663	658,428,914
Total Accrued Liability	1,263,806,590	1,233,493,873	1,153,619,256	966,310,485
AVA / Total Accrued Liability	73.9%	72.5%	67.2%	68.1%
<u>Net Cash Flow Ratio</u>				
Net Cash Flow ¹	(43,659,740)	(44,391,271)	(37,290,288)	(24,741,608)
Market Value of Assets (MVA)	861,142,491	1,000,315,787	786,356,140	642,644,347
Ratio	-5.1%	-4.4%	-4.7%	-3.8%

¹ Determined as total contributions minus benefit payments and administrative expenses.

PLAN PROVISIONS

The following describe and reflect provisions in effect as described in Chapter 5505 of the Ohio Revised Code.

Membership Eligibility

All sworn officers and cadets in training at the academy are required to become members of the retirement system. The beginning date of membership in the system for sworn officers hired prior to June 30, 1991, is the commission date. All cadets entering the academy after that date become members of OHPRS upon entering the academy. Any persons hired prior to November 2, 1989, in the radio division are HPRS members. The beginning date of membership of the radio division member is the date of hire.

Highway Patrol Retirement System

The Plan is established and administered as prescribed by “Chapter 5505-Highway Patrol Retirement System” of the Ohio Revised Code.

Plan Administration

The Plan is administered by a Board of Trustees comprised of:

- a) The superintendent of the state highway patrol,
- b) Two retired Members who reside in Ohio,
- c) Five active Members,
- d) One member appointed by the treasurer of state, and
- e) Two investment expert members. One is appointed by the governor, and the other is jointly appointed by the speaker of the house of representatives and the president of the senate.

Credited Service

Total service credit is the total years of contributing service, or part thereof, purchased service credit and any additional service credit approved by the Board.

Normal Retirement

Eligibility

Age 52 and 20 years of Credited Service. or
Age 48 with 25 years of Credited Service if hired prior to January 1, 2020.

Benefit

Sum of:

- a) 2.5% of final average salary [average of salaries during highest 5 years (3 years prior to January 1, 2015)] times years of service not in excess of 20,
- b) 2.25% of final average salary times years of service in excess of 20 but not in excess of 25 and,
- c) 2% of final average salary times years of service in excess of 25. The maximum pension payable is 79.25% of the member’s final average salary.

A member must retire upon attainment of age 60 or completion of 20 years of service, whichever occurs later.

Form of Benefit

A member can elect one of the following options:

- a) A Single Life Annuity or,
- b) Actuarial equivalent Joint and Survivor Annuity with designating any percentage over 10% to the beneficiary or,
- c) Life Annuity Certain and Continuous between 5 to 20 years or,
- d) Partial Lump Sum if a member who is at least 52 with 20 years of total service; the partial lump sum benefit is not less than 6 times the monthly amount payable to the member as a single lifetime pension and not more than 60 times that amount

Early Retirement

Eligibility

Age 48 through 51 and has accumulated at least 20 years but less than 25 years of Credited Service. Or
 Age 48 through 51 and has accumulated at least 20 years of Credited Service if hired on or after January 1, 2020.

Benefit

Normal Retirement benefit, reduced as followed

Attained Age	Percent of normal retirement benefit
48	75%
49	80%
50	86%
51	93%

Form of Benefit

Same as Normal Retirement.

Disability Benefit

Eligibility

Total and permanent as determined by the Board of Trustees incapacitated for in the line of duty or five or more years of service for disability incurred off-duty.

Benefit Amount

- A maximum of:
- a) 61.25% of final average salary, and;
 - b) The normal retirement pension that the Member is entitled to receive if he or she retired immediately.

For off-duty disabilities, a benefit is the larger of:

- a) 30% of final average salary or
- b) normal retirement pension.

Cost-of-Living Adjustment

Retirees: A cost of living allowance (COLA) will be received after age 60 (age 53 for members retired or entered the DROP prior to 1/7/2013) or twelve months after they retire, whichever is later.

Disability members retired prior to 1/7/2013 are eligible for the increase after receiving benefits for sixty months or age 53 whichever occurs first.

The board establishes an annual COLA between 0% and 3% and must be based on compliance with the amortization period requirement of section 5505.121 of the Ohio Revised Code. The board's determination shall be based on the annual actuarial valuation required by section 5505.12 of the Ohio Revised Code. If the board determines that an increase may be made, the increase shall not exceed three percent (3%) of the eligible person's pension. The base pension used in the first calculation for the additional COLA amount shall remain as the COLA base for all future increases. The current COLA is as follows:

Calendar Year	COLA
2021	0.00%
2022-2023	3.00%
2024+	0.00%

Survivor Benefit

Eligibility

A surviving spouse is considered to be the wife or husband as set forth in a statutory valid certificate of marriage or as recognized by judgment of a court. A surviving child is considered to be the child by birth or the legally adopted child of the member or retiree.

Benefit Amount

Surviving spouse and dependent children pension amounts are established by statute as follows:

- a) A surviving spouse is eligible to receive pension benefits for the remainder of his/her life.
 - 1. A surviving spouse of a member who retired or entered DROP before May 11, 2018, will receive an amount equal to 50% of the retiree's pension benefit or \$900.00/month, whichever is greater.
 - 2. A surviving spouse of a member who retired or entered DROP on or after May 11, 2018, will receive a set amount (\$900.00/month in 2018), but this amount increases annually by a COLA amount set by the board. The survivor benefit is in addition to any amount selected through a Joint and Survivor Annuity (JSA).
 - 3. A surviving spouse of an active member who is not eligible for retirement will receive a set amount (\$900.00/month in 2018), but this amount increases annually by a COLA amount set by the board.

4. A surviving spouse of an active member who is eligible for retirement but has not elected to enter DROP or retire will receive a 50% JSA calculated on what the member's pension would have been had he/she retired the day after death. In addition, the surviving spouse will receive the established survivor benefit set for that year.

b) A surviving child is considered to be the child by birth or the legally adopted child of the member or retiree.

1. A surviving child is eligible for benefits until attainment of age 18 or marriage; however, survivor benefits will continue until age 23 if such dependent child is a full-time student. Benefits are \$150 per month.

2. A surviving child who is physically or mentally incompetent and who was totally dependent on the deceased member or retiree at the time of death is eligible for benefits until recovery or death. Benefits are \$150 per month.

Additionally, a \$5,000 lump sum benefit is payable upon the death of the retiree.

Vesting (Termination) Benefit:

Vesting Service Requirement 15 or more years of credit service.

Non-Vested Benefit Refund of Member Contributions.

Vested Benefit Payable upon reaching age 55 (or 48 with reduced benefit or 52 with unreduced benefit, if a member who has accumulated at least 20 years), provided contributions are not withdrawn, or a refund of member contributions. The termination benefit is 1.50% of average final salary times creditable service. If a member has completed 20 years of service and retires, they are eligible to receive a pension computed in the same manner as a retirement benefit.

Minimum Benefit:

All members who retired with a Retirement or Disability Benefit are eligible to receive a minimum benefit of \$1,050 per month.

Contributions

Member Set by the retirement board annually. The percentage shall be not less than 10.0% and no more than 14.0% of a member's Salary.

Employer The employer contribution rate is set by statute, currently set at 26.5%.

SUPPLEMENTARY TABLES

Table 1 – History of the Development of Unfunded Actuarial Accrued Liability

	Year Ending December 31				
	2022	2021	2020	2019	2018
1. Unfunded Actuarial Accrued Liability (UAAL), as of beginning of year	339,064,208	359,142,477	376,870,851	389,082,362	378,948,593
2. Total Normal Cost, as of beginning of year	21,642,376	23,185,205	23,052,454	23,248,328	22,033,532
3. Expected Interest on 1. and 2.	26,151,227	27,718,757	28,994,440	29,893,975	30,222,315
4. Contributions, with interest	48,649,726	48,238,010	52,776,845	51,117,770	42,241,099
5. Expected UAAL as of end of year (1)+(2)+(3)-(4)	338,208,085	361,808,429	376,140,900	391,106,895	388,963,341
6. Change in UAAL Due to Actuarial (Gain)/Loss, by component:					
Investment Return	(19,794,133)	(33,827,426)	(23,558,102)	154,476	31,264,298
Salary Increases	7,815,539	(4,141,467)	(504,174)	1,711,714	(459,716)
Decrement Experience	4,183,856	1,297,889	(4,186,700)	(7,319,472)	(1,453,717)
Inactive Mortality Experience	(876,461)	1,112,614	(670,280)	5,696,925	
Other Changes	(256,441)	2,070,445	1,016,334	772,615	2,351,765
Total change due to (Gain)/Loss	(8,927,640)	(33,487,944)	(27,902,922)	1,016,258	31,702,630
7. Change in UAAL Due to Assumption Changes/ Method Changes/Benefit Changes	32,517	10,743,723	10,904,499	(15,252,302)	(31,583,609)
8. Unfunded Actuarial Accrued Liability, as of end of year	329,312,962	339,064,208	359,142,477	376,870,851	389,082,362

Table 2 – History of Active Member Data

Actuarial Valuation Date	Active Members	Percent Increase	Annual Covered Payroll	Percent Increase	Average Covered Payroll	Percent Increase
12/31/2013	1,613		98,519,844		61,079	
12/31/2014	1,622	0.6%	99,211,756	0.7%	61,166	0.1%
12/31/2015	1,621	-0.1%	99,983,224	0.8%	61,680	0.8%
12/31/2016	1,670	3.0%	108,788,871	8.8%	65,143	5.6%
12/31/2017	1,650	-1.2%	112,705,188	3.6%	68,306	4.9%
12/31/2018	1,668	1.1%	116,009,622	2.9%	69,550	1.8%
12/31/2019	1,614	-3.2%	118,370,595	2.0%	73,340	5.4%
12/31/2020	1,542	-4.5%	117,996,230	-0.3%	76,522	4.3%
12/31/2021	1,454	-5.7%	111,621,001	-5.4%	76,768	0.3%
12/31/2022	1,380	-5.1%	112,476,672	0.8%	81,505	6.2%
5-year Average Increase/ (Decrease)		-3.5%		0.0%		3.6%

Table 3 – History of Retiree and Survivor Annuitant Data

Actuarial Valuation Date	Number of Annuitant	Total Annuities (Annual)	Average Annuities (Annual)	Increase in Average Benefit
12/31/2013	1,523	56,007,360	36,774	
12/31/2014	1,558	58,292,436	37,415	1.74%
12/31/2015	1,548	59,723,304	38,581	3.12%
12/31/2016	1,580	62,458,476	39,531	2.46%
12/31/2017	1,637	65,661,636	40,111	1.47%
12/31/2018	1,671	67,722,984	40,528	1.04%
12/31/2019	1,699	69,831,187	41,101	1.41%
12/31/2020	1,730	71,554,792	41,361	0.63%
12/31/2021	1,807	74,823,557	41,408	0.11%
12/31/2022	1,852	78,364,733	42,314	2.19%

Table 4 – History of Employee Annuitants and Survivors Added to Payroll

Year of Retirement	Added		Removed		Total	
	Number	Annual Benefits ¹	Number	Annual Benefits	Number	Annual Benefits
2013	61	3,204,660	35	843,804	1,523	56,007,360
2014	66	3,008,568	31	723,492	1,558	58,292,436
2015	73	3,102,744	83 ²	1,671,876	1,548	59,723,304
2016	69	3,576,372	37	841,200	1,580	62,458,476
2017	83	3,878,244	26	675,084	1,637	65,661,636
2018	72	3,127,464	38	1,066,116	1,671	67,722,984
2019	63	2,881,148	35	772,944	1,699	69,831,187
2020	83	3,372,681	52	1,649,076	1,730	71,554,792
2021	120	4,613,439	43	1,344,674	1,807	74,823,557
2022	99	5,358,174	54	1,816,998	1,852	78,364,733

1. Includes added benefits due to COLA increases for continuing retirees and survivors.
2. Includes Alternate Payee records, which were combined with Participant records beginning with the December 31, 2015 valuation.

Table 5 – History of Annual Financial Report Asset Information

Year Ended	Pension Fund								Health Care Fund			
	Addition By Source				Deductions By Type				Addition By Source		Deductions By Type	
	Employer Contributions	Employee Contributions	Net Investment Income	Transfers from Other Systems	Administrative Expenses	Benefit Payments	Refunds	Transfers to Other Systems	Employer Contributions & Retiree Drug Subsidy and Prescription Drug Rebates	Net Investment Income	Benefits	Administrative Expenses
12/31/2013	22,908,182	10,037,246	115,874,530	1,353,520	909,929	61,528,826	943,433	467,462	4,718,651	17,893,377	12,140,996	140,676
12/31/2014	22,325,421	11,577,268	45,104,959	586,929	1,031,473	64,525,978	2,177,476	165,945	5,859,320	6,799,267	12,308,478	156,176
12/31/2015	22,895,242	13,686,292	(5,649,718)	947,265	1,084,161	66,213,253	857,626	160,888	5,637,420	(647,032)	11,362,048	157,150
12/31/2016	25,383,684	14,101,171	46,423,126	773,206	1,352,722	65,720,438	1,730,725	416,679	5,944,616	6,834,760	11,676,450	193,246
12/31/2017	26,109,836	14,504,919	101,482,224	619,110	1,437,267	75,392,803	1,074,973	140,562	6,777,825	14,467,179	11,571,393	204,198
12/31/2018	26,014,314	14,451,649	(37,810,306)	410,250	1,435,864	71,577,589	716,739	210,895	7,784,260	(5,852,119)	11,699,575	203,812
12/31/2019	33,107,047	15,618,020	129,802,232	781,873	1,649,904	73,577,433	1,556,151	147,156	2,983,659	18,006,553	11,602,364	229,044
12/31/2020	32,855,342	17,334,068	121,212,655	826,595	1,509,348	78,580,417	2,552,672	54,203	3,321,187	16,140,521	11,624,232	200,961
12/31/2021	30,089,578	15,896,368	136,722,435	638,854	970,978	85,808,565	3,597,674	45,739	5,816,018	17,793,515	11,977,400	126,296
12/31/2022	28,972,464	17,361,370	(96,156,340)	804,605	1,331,254	84,877,194	3,785,126	161,821	5,523,742	(12,854,216)	7,484,527	177,933

Table 6 – Funding Progress

Fiscal Year	Actuarial Accrued Liability	Actuarial Value of Assets	Fair Value of Net Assets	AVA / FVA	UAAL (AVA)	UAAL (FVA)	Funded Ratio (AVA)	Funded Ratio (FVA)	Covered Payroll	Funding Years
2013	989,101,470	690,605,582	728,968,175	94.74%	298,495,888	260,133,295	69.8%	73.7%	98,519,844	30
2014	1,012,752,337	712,285,604	740,661,880	96.17%	300,466,733	272,090,457	70.3%	73.1%	99,211,756	29
2015	1,078,984,597	739,848,920	704,225,033	105.06%	339,135,677	374,759,564	68.6%	65.3%	99,983,224	30
2016	1,127,927,927	763,667,712	721,685,656	105.82%	364,260,215	406,242,271	67.7%	64.0%	108,788,871	29
2017	1,153,619,256	774,670,663	786,356,140	98.51%	378,948,593	367,263,116	67.2%	68.2%	112,705,188	27
2018	1,158,179,566	769,097,204	715,480,960	107.49%	389,082,362	442,698,606	66.4%	61.8%	116,009,622	23
2019	1,173,155,313	796,284,462	817,859,488	97.36%	376,870,851	355,295,825	67.9%	69.7%	118,370,595	23
2020	1,203,886,606	844,744,129	907,391,508	93.10%	359,142,477	296,495,098	70.2%	75.4%	117,996,230	22
2021	1,233,493,873	894,429,665	1,000,315,787	89.41%	339,064,208	233,178,086	72.5%	81.1%	111,621,001	24
2022	1,263,806,590	934,493,628	861,142,491	108.52%	329,312,962	402,664,099	73.9%	68.1%	112,476,672	21

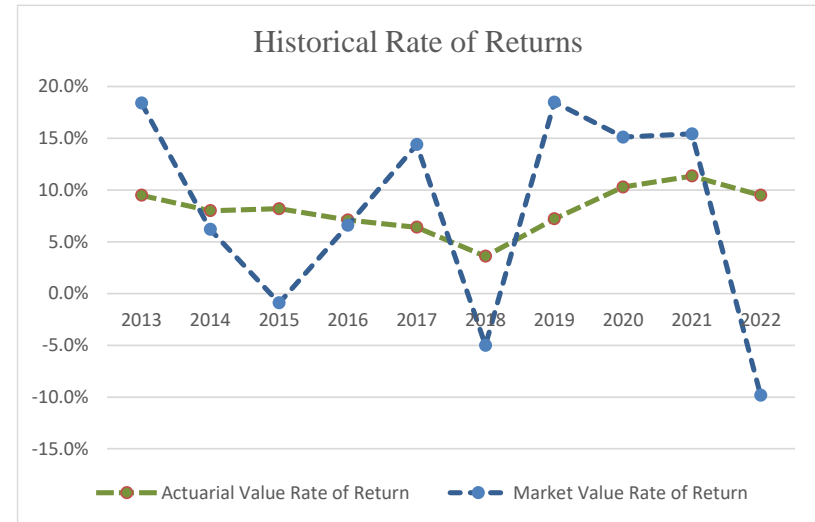
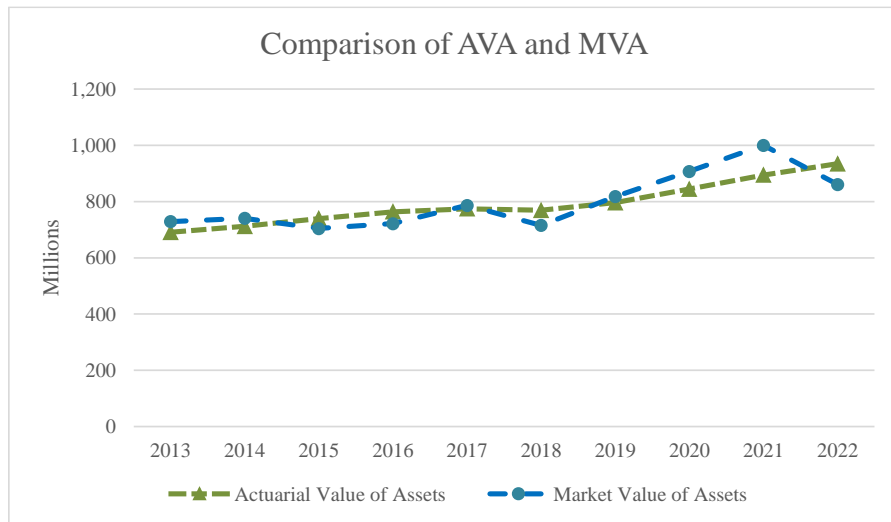


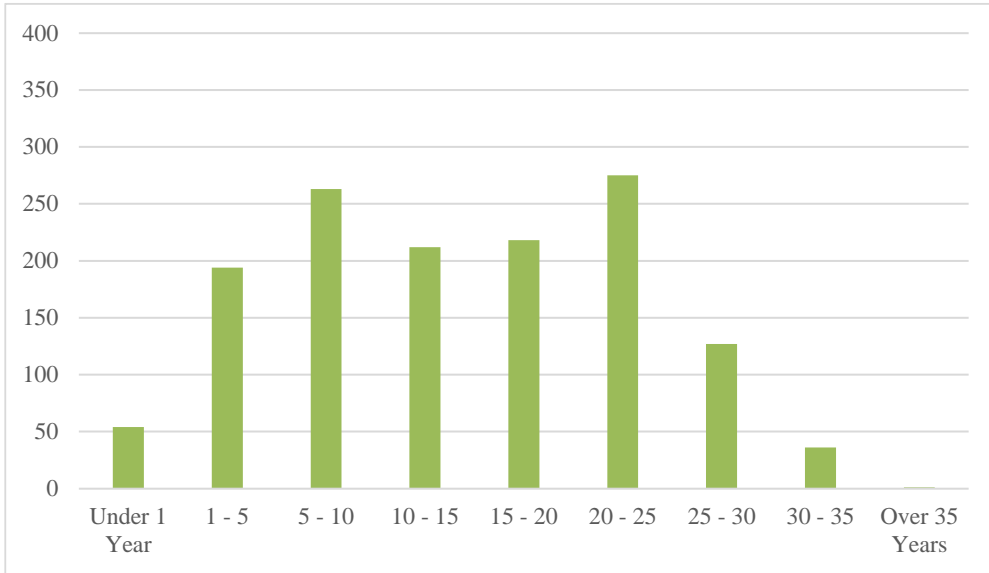
Table 7 – Solvency Test

	Actuarial Accrued Liabilities			Actuarial Value of Assets	Portion of Liabilities Covered by Assets		
	(1)	(2)	(3)		(1)	(2)	(3)
Year Ended	Active Member Contributions	Retirees, Survivors and Vested Deferreds	Active Members (ER Financed)		Active Member Contributions	Retirees, Survivors and Vested Deferreds	Active Members (ER Financed)
12/31/2013	113,334,067	601,342,081	274,425,322	690,605,582	100%	96%	0%
12/31/2014	117,441,639	622,719,141	272,591,557	712,285,604	100%	96%	0%
12/31/2015	122,286,821	662,562,480	294,135,296	739,848,920	100%	93%	0%
12/31/2016	127,311,764	688,936,795	311,679,368	763,667,712	100%	92%	0%
12/31/2017	130,494,700	717,621,283	305,503,273	774,670,663	100%	90%	0%
12/31/2018	138,101,643	706,952,911	313,125,012	769,097,204	100%	89%	0%
12/31/2019	143,160,097	719,452,018	310,543,198	796,284,462	100%	91%	0%
12/31/2020	147,608,705	748,539,825	307,738,076	844,744,129	100%	93%	0%
12/31/2021	144,993,174	797,843,018	290,657,681	894,429,665	100%	94%	0%
12/31/2022	144,460,309	830,076,790	289,269,491	934,493,628	100%	95%	0%

Table 8 – Contribution History

Year Ended	Actuarially Determined Contribution for Fiscal Year End	Actual Contribution	Deficiency (Excess) in Annual Contribution	% of Actuarially Determined Contribution Contributed
12/31/2013	35,429,985	22,908,182	12,521,803	65%
12/31/2014	29,767,228	22,325,421	7,441,807	75%
12/31/2015	22,446,316	22,895,242	(448,926)	102%
12/31/2016	24,407,389	25,383,684	(976,295)	104%
12/31/2017	25,349,355	26,109,836	(760,481)	103%
12/31/2018	26,014,314	26,014,314	0	100%
12/31/2019	31,269,882	33,107,047	(1,837,165)	106%
12/31/2020	32,265,286	32,855,342	(590,056)	102%
12/31/2021	31,938,478	30,089,578	1,848,900	94%
12/31/2022	28,708,522	28,972,464	(263,942)	101%

Graph 9 – Distribution of Active Members by Service



Graph 10 – Distribution of Active Members by Age

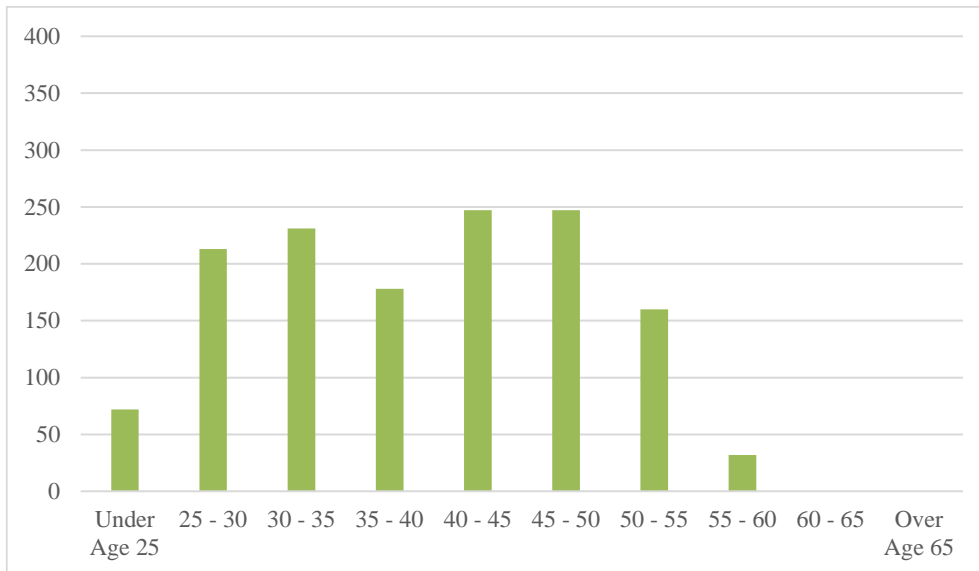
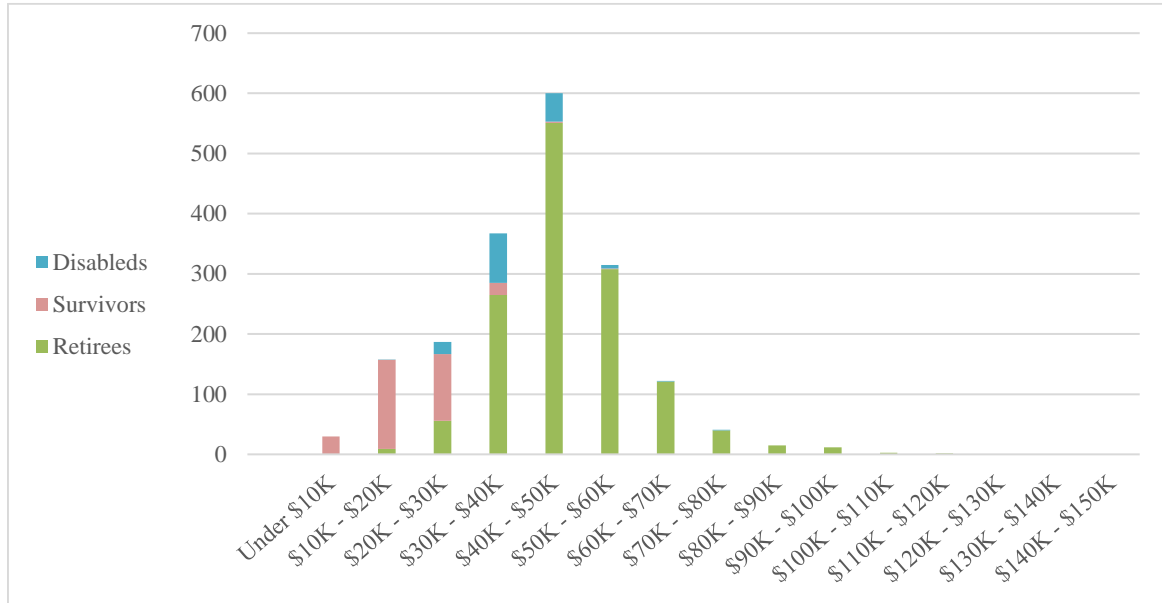
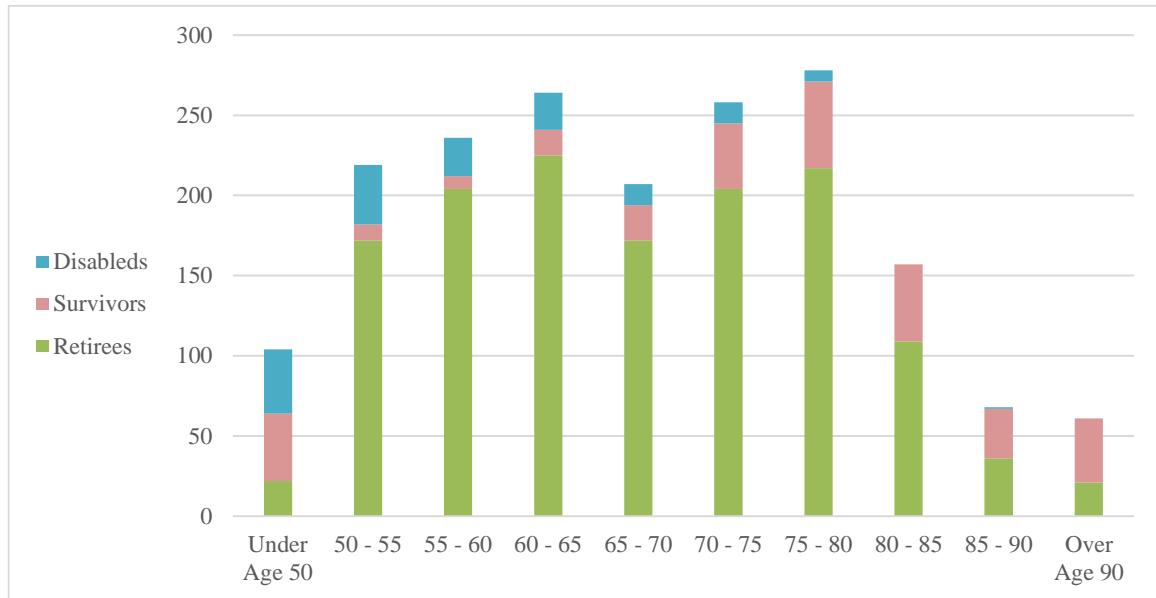


Table 11 – Distribution of Annuitants by Annual Benefit



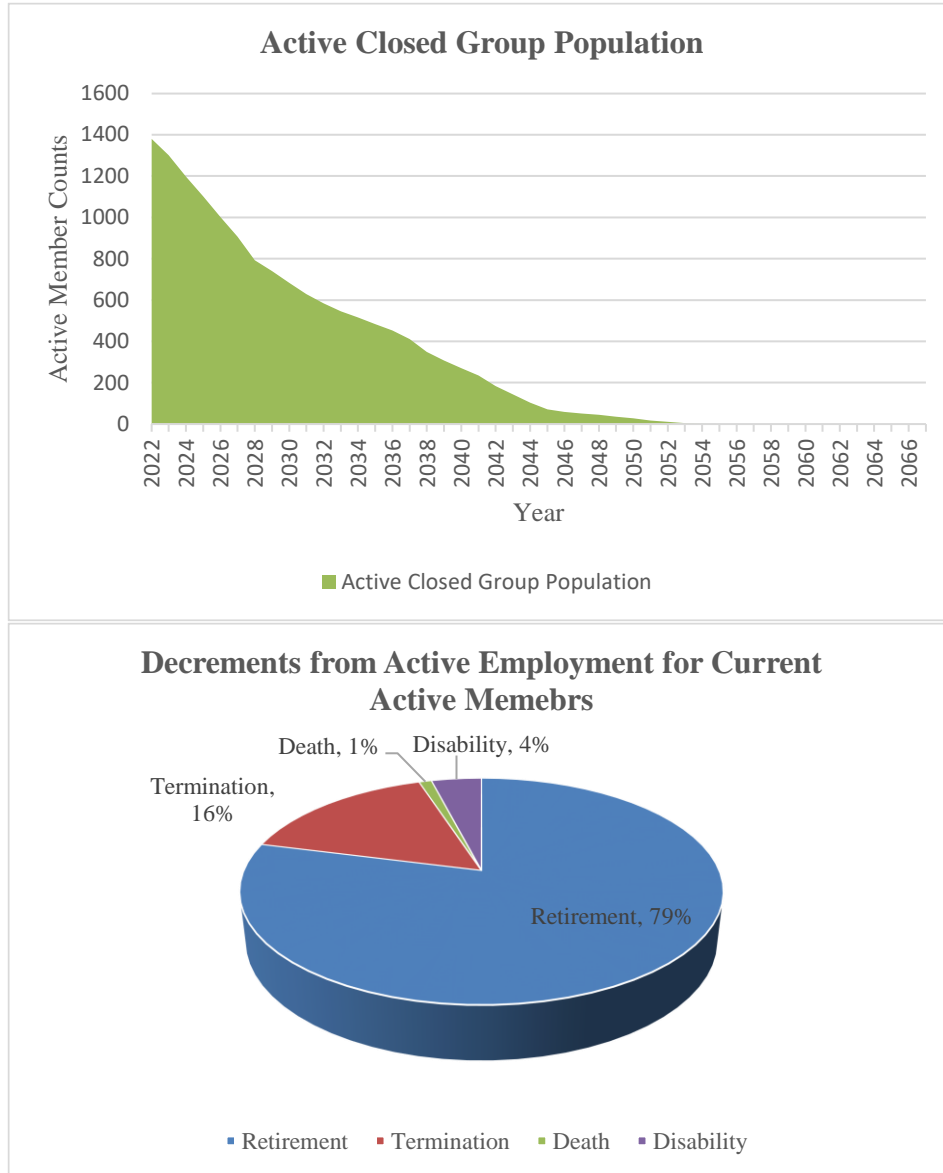
Annual Benefit	Retirees	Survivors	Disableds	Total
Under \$10K	0	30	0	30
\$10K - \$20K	9	148	1	158
\$20K - \$30K	56	111	20	187
\$30K - \$40K	265	20	82	367
\$40K - \$50K	551	2	47	600
\$50K - \$60K	308	1	6	315
\$60K - \$70K	121	0	1	122
\$70K - \$80K	40	0	1	41
\$80K - \$90K	15	0	0	15
\$90K - \$100K	12	0	0	12
\$100K - \$110K	3	0	0	3
	1382	312	158	1852

Table 12 – Distribution of Annuitants by Age



Age	Retirees	Survivors	Disableds	Total
Under Age 50	22	42	40	104
50 - 55	172	10	37	219
55 - 60	204	8	24	236
60 - 65	225	16	23	264
65 - 70	172	22	13	207
70 - 75	204	41	13	258
75 - 80	217	54	7	278
80 - 85	109	48	0	157
85 - 90	36	31	1	68
Over Age 90	21	40	0	61
Total	1,382	312	158	1,852

Graph 13-Projected Headcount of Present Population



The charts above show the expected future development of the present population in simplified terms. The Retirement System presently covers 1,380 active members. Eventually, 16% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit or separating from service without withdrawing contributions. 79% of the present population is expected to receive monthly retirement benefits by retiring directly from active service. 5% of the present population is expected to become eligible for death-in-service or disability benefits. Within 9 years, over half of the covered membership is expected to consist of new hires.

Table 14 – Active DROP Members as of December 31, 2022

Attained Ages	No.	Annual Benefit	DROP Account Balance
48	17	\$ 980,252	\$ 404,570
49	12	673,986	1,003,784
50	15	849,928	1,526,928
51	15	799,548	1,943,220
52	18	903,808	1,534,369
53	24	1,087,411	3,988,541
54	13	641,580	3,444,196
55	10	427,785	1,938,848
56	9	378,214	2,472,592
57	7	294,993	1,981,671
58	2	76,502	709,712
59	2	74,062	285,609
Total	144	\$ 7,188,069	\$ 21,234,040