Government Employees' Retirement System of the Virgin Islands

Actuarial Valuation and Review as of September 30, 2022

This report has been prepared at the request of the Board of Trustees to assist in administering the System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Board of Trustees and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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January 25, 2024

Board of Trustees
Government Employees' Retirement System of the Virgin Islands
GERS Complex
3438 Kronprindsens Gade
St. Thomas, Virgin Islands, 00802

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of September 30, 2022. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal year ending September 30, 2022.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board of Trustees to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the Government Employees' Retirement System of the Virgin Islands (GERS) staff under the direction of Mr. Angel Dawson, Jr. That assistance is gratefully acknowledged.

The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. The assumptions used in this actuarial valuation were approved by the Board based upon our analysis and recommendations. In our opinion, the assumptions are reasonable and take into account the experience of Plan and reasonable expectations for the Retirement System. In addition, in our opinion, the comnbined effect of these assumptions is expected to have no significant bias.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,
Segal

Aldwin Frias, FSA, FCA, MAAA, EA
Senior Vice President and Actuary

Jonathan Scarpa, FSA, MAAA, EA
Vice President and Actuary

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Section 1: Actuarial Valuation Summary

Purpose and basis

This report has been prepared by Segal to present a valuation of the Plan as of September 30, 2022. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to provide information for required disclosures under Governmental Accounting Standards Board (GASB) Statements No. 67. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the Plan's benefit obligations. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Retirement System, as administered by the Board as of September 30, 2022;
- The characteristics of covered active members, inactive vested members, and retired members and beneficiaries as of September 30, 2022, provided by the GERS;
- The assets of the Plan as of September 30, 2022, provided by the Fund Auditor;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc. and
- The funding policy adopted by the System and prescribed in the Virgin Islands Code.

Certain disclosure information required by GASB Statement Nos. 67 and 68 as of September 30, 2022 for the System is provided in a separate report.

Valuation highlights

1. On April 6, 2022, the Virgin Islands Public Finance Authority issued a Funding Note to GERS in the principal amount of $3,805,294,438 payable with varying installment amounts ranging from $73.6 million to $158.0 million each year over the next 29 years. It is our understanding the October 2023 actual installment amount fell short of the expected amount of $158.0 million by $34 million.

2. This valuation reflects the assumption changes that were presented during the July 2023 Board Retreat based on recommendations from the Actuarial Experience Study for the period October 1, 2017 through September 30, 2022. Specifically,

   a. The net investment return assumption was increased from 4.0% to 6.0%.

   b. Additional revisions to the retirement rate assumption from active status, withdrawal rates, mortality rates for healthy and disabled lives and assumed increases in salary based on recent plan experience.

   In addition, we have reflected an administrative expense assumption change based on the final audited financial statement received from the Fund Auditor. As a result of these assumption changes, the total normal cost decreased by $34.4 million, and the actuarial accrued liability decreased by $834.7 million. The total impact was a decrease in the ADEC of $49.8 million, or 11.5% of projected payroll.

3. Based on the results of this valuation, absent future Funding Note payments, the System is projected to run out of assets by August 2025. After reflecting the GERS funding note including the $34 million shortfall in the October 2023 installment, the System is projected to run out of assets by June 2037. However, the System is projected to be temporarily insolvent for only two years. Beginning in the year ending September 30, 2039 assets are projected to be positive and projected to increase for all years thereafter.

4. It is our understanding that the legislation that covers the System provides that contributions are to be made on an actuarial reserve basis. An actuarial valuation is performed to calculate the “Actuarially Determined Employer Contributions” (ADEC) and is based on the assumptions and methods adopted by the Board for this purpose.

5. Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The funding policy adopted by the Board meets this standard. However, the actual amounts contributed by the government employers to the System have not been based on the ADEC amounts. The amounts contributed have been significantly less than the ADEC (see *Section 2: History of Employer Contributions*) for at least the past 20 years.

a. While the employer contribution rate is currently at 23.5% of pay, the ADEC has increased from 35% of pay in 2007 to 72% of pay as of September 30, 2022.

b. Therefore, benefits are not being funded adequately on an actuarial basis. Section 718(I) of the Virgin Islands Code prohibits the Board from paying benefits that are not adequately funded.

6. Since 2006, the System's funded percentage has declined from 56% to 10% based on the investment return assumption used for the funding valuation (currently, 6.0%). The funded percentage as of September 30, 2022 based on GASB 67/68 accounting standards is 8.9%, which uses a discount rate of 4.77%. As indicated above, this decline is primarily due to contributions being significantly less than the amount necessary for proper plan funding.

7. It is important to note that this actuarial valuation is based on plan assets and demographic information provided as of September 30, 2022. The Plan's actuarial status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the Plan Year. While it is impossible to determine how the market will perform in the short term, and how that will affect the results of next year's valuation, Segal is available to prepare projections of potential outcomes upon request. Unfavorable asset experience will increase the actuarial cost of the System, while favorable experience will decrease the actuarial cost of the System.

8. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. For each of the past several years, we have provided sensitivity and scenario projections to highlight the impact of varying investment returns, lower employment levels, changes in contribution requirements and plan design including potential benefit reductions. These risk assessments and projections are important for the Board because:

a. The System's assets are projected to decline as benefit and expense outflow is greater than contribution and expected investment income, even after reflecting the expected revenue from the GERS funding note.

b. They provide the Board with possible recommendations to the Governor and the Legislature on potential changes in the plan of benefits and additional contributions required for the System to remain solvent in the long-term, and

c. The outlook for financial markets, future employment level and the economic activity in the US Virgin Islands is uncertain.

Summary of key valuation results

		September 30, 2022	September 30, 2021
Contributions for plan year beginning October 1	• Actuarially determined employer contributions (ADEC)[1]	$311,958,096	$361,771,924
	• Actuarially determined employer contributions as a percent of payroll	72.02%	84.24%
	• Expected employer contributions[2]	259,794,030	190,126,029
	• Shortfall	52,164,066	171,645,895
Actuarial accrued liability for plan year ending September 30	• Retired participants and beneficiaries	$2,595,711,649	$2,970,059,611
	• Inactive vested participants	111,897,532	212,365,695
	• Inactive participants due a refund of employee contributions	17,693,855	12,662,776
	• Active participants	1,234,153,513	1,649,181,370
	• Total	3,959,456,549	4,844,269,452
	• Normal cost including administrative expenses	59,538,452	94,670,055
Assets for plan year Funded status for plan year ending September 30	• Market value of assets (MVA)	$400,330,991	$475,127,907
	• Unfunded actuarial accrued liability	$3,559,125,558	$4,369,141,545
	• Funded percentage	10.11%	9.81%
	• Projected insolvency date	June 2037	N/A[3]
Key assumptions	• Net investment return	6.00%	4.00%
	• Inflation rate	2.50%	2.50%
GASB information	• Discount rate	6.00%	4.00%
	• 20-year bond rate	4.02%	2.26%
	• Blended rate	4.77%	2.52%
	• Total Pension Liability	$4,491,404,535	$5,770,941,174
	• Plan Fiduciary Net Position	400,330,991	475,127,907
	• Net Pension Liability	4,091,073,544	5,295,813,267
	• Plan Fiduciary Net Position as a percentage of Total Pension Liability	8.91%	8.23%
Demographic data for plan year ending September 30	• Number of retired participants and beneficiaries	8,899	8,783
	• Number of active participants	8,712	8,928
	• Total covered payroll	$433,180,978	$429,477,835
	• Average salary	$49,722	$48,105

[1] The ADEC is the actuarial determined contributions as developed in Section 2, net of projected member contributions

[2] Includes the installments from the GERS Funding Note

[3] Without regard to the GERS Funding Note contributions to be paid over the next 30 years, GERS was projected to be insolvent by March 2025

Important information about actuarial valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan provisions	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant information	An actuarial valuation for a plan is based on data provided to the actuary by the System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Financial information	The valuation is based on the market value of assets as of the valuation date, as provided by the Fund Auditor.
Actuarial assumptions	In preparing an actuarial valuation, Segal starts by developing a forecast of the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of participants in each year, as well as forecasts of the plan's benefits for each of those events. In addition, the benefits forecasted for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The forecasted benefits are then discounted to a present value, typically based on an estimate of the rate of return that will be achieved on the plan's assets. All of these factors are uncertain and unknowable. Thus, there will be a range of reasonable assumptions, and the results may vary materially based on which assumptions are selected within that range. That is, there is no right answer (except with hindsight). It is important for any user of an actuarial valuation to understand and accept this constraint. The actuarial model may use approximations and estimates that will have an immaterial impact on our results. In addition, the actuarial assumptions may change over time, and while this can have a significant impact on the reported results, it does not mean that the previous assumptions or results were unreasonable or wrong.
Models	Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary. The blended discount rate used for calculating total pension liability is based on a model developed by our Actuarial Technology and Systems unit, comprised of both actuaries and programmers. The model allows the client team, under the supervision of the responsible actuary, control over the entry of future expected contribution income, benefit payments and administrative expenses. The projection of fiduciary net position and the discounting of benefits is part of the model.

Section 1: Actuarial Valuation Summary

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the System. Segal is not responsible for the use or misuse of its report, particularly by any other party.
An actuarial valuation is a measurement at a specific date — it is not a prediction of a plan's future financial condition. Accordingly, Segal did not perform an analysis of the potential range of financial measurements, except where otherwise noted.
If the system is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan provisions, but they may be subject to alternative interpretations. The System should look to their other advisors for expertise in these areas.
While Segal maintains extensive quality assurance procedures, an actuarial valuation involves complex computer models and numerous inputs. In the event that an inaccuracy is discovered after presentation of Segal's valuation, Segal may revise that valuation or make an appropriate adjustment in the next valuation.
Segal's report shall be deemed to be final and accepted by the System upon delivery and review. Trustees should notify Segal immediately of any questions or concerns about the final content.

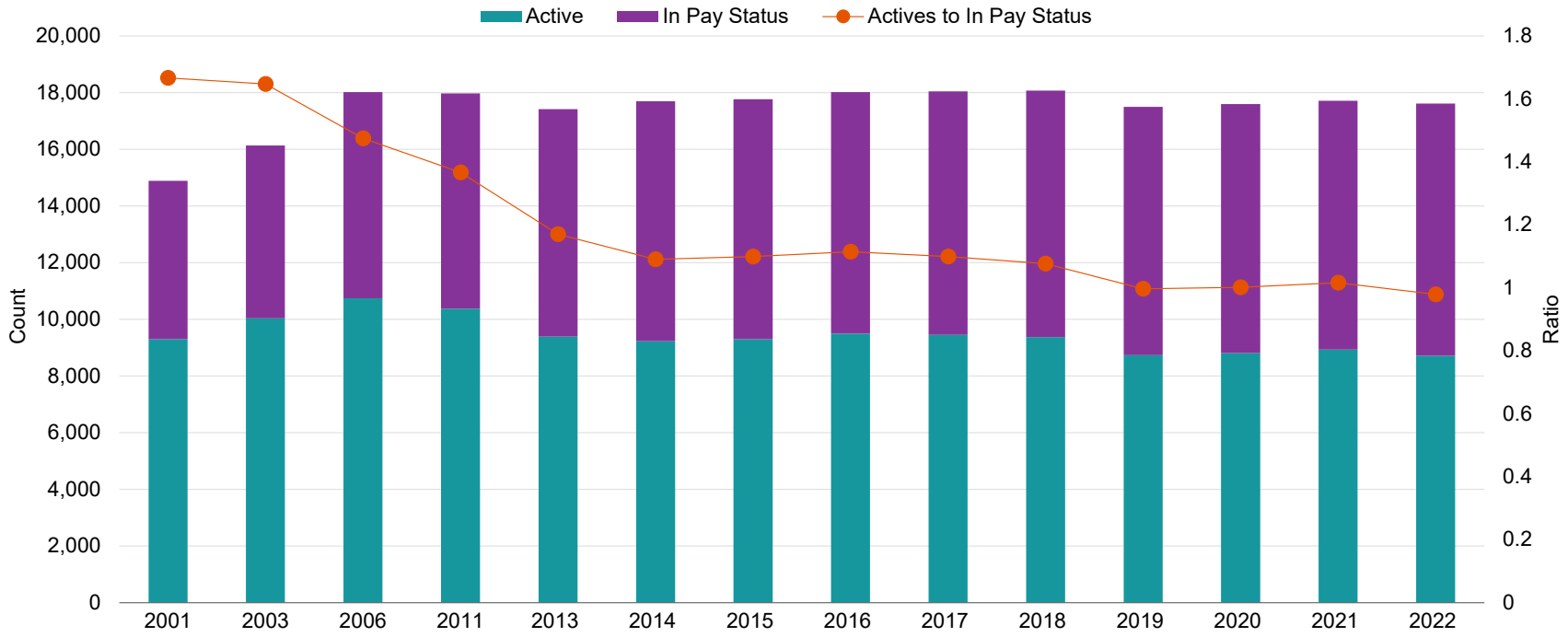
As Segal has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Retirement Plan.

Section 2: Actuarial Valuation Results

Member information

- There are inactive members with rights to deferred vested pensions and/or refund of employee contributions that are not shown in the chart below. For purposes of this valuation, the potential liability for such inactive members is reflected.

Participant Population as of September 30



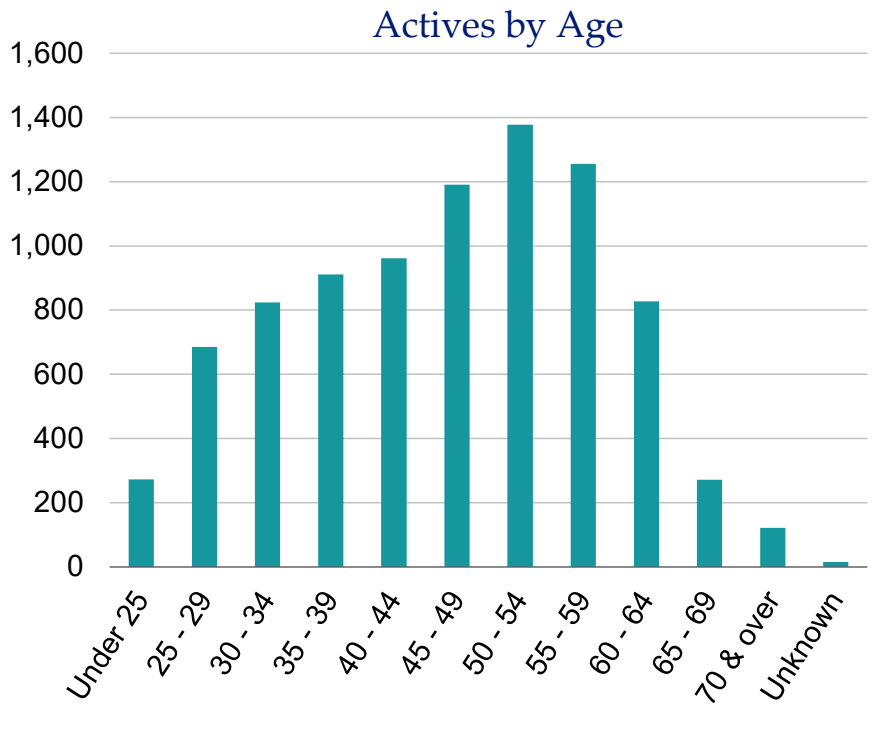
	2001	2003	2006	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
In Pay Status	5,581	6,093	7,282	7,592	8,024	8,465	8,465	8,520	8,592	8,702	8,761	8,792	8,783	8,899
Active	9,303	10,037	10,739	10,376	9,393	9,227	9,303	9,499	9,448	9,368	8,736	8,804	8,928	8,712
Ratio	1.67	1.65	1.47	1.37	1.17	1.09	1.10	1.11	1.10	1.08	1.00	1.00	1.02	0.98

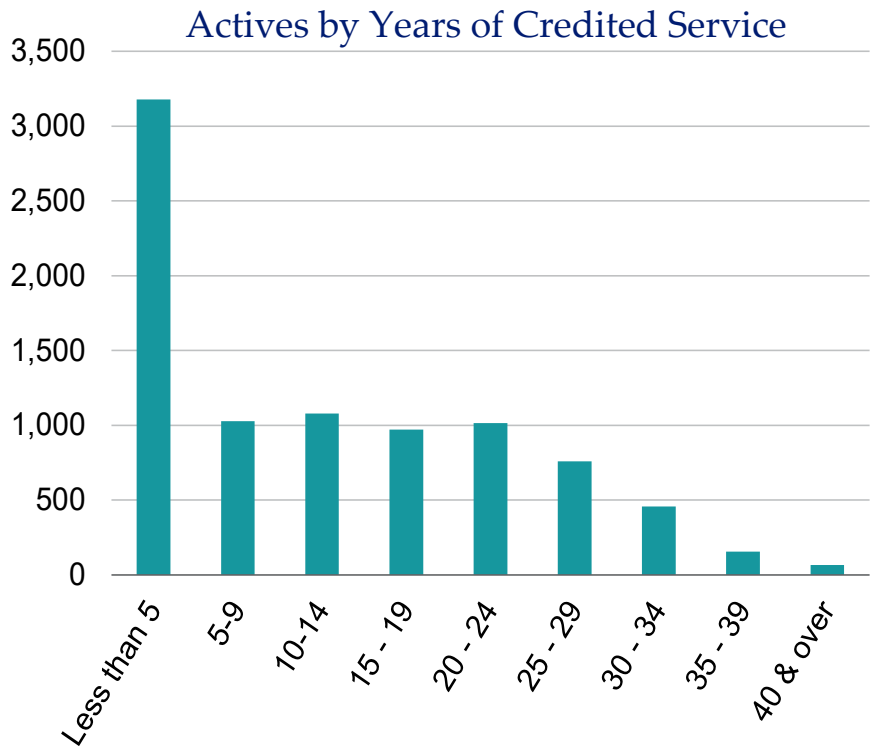
Active members

As of September 30,	2022	2021	Change
Active members	8,712	8,928	-2.4%
Average age	46.7	46.8	-0.1
Average years of credited service	12.7	13.0	-0.3
Average compensation	$49,722	$48,105	3.4%

- Among the active members, there were 5,373 Tier 2[1] employees as compared to 5,264 in the prior year.

Distribution of Active Participants as of September 30, 2022





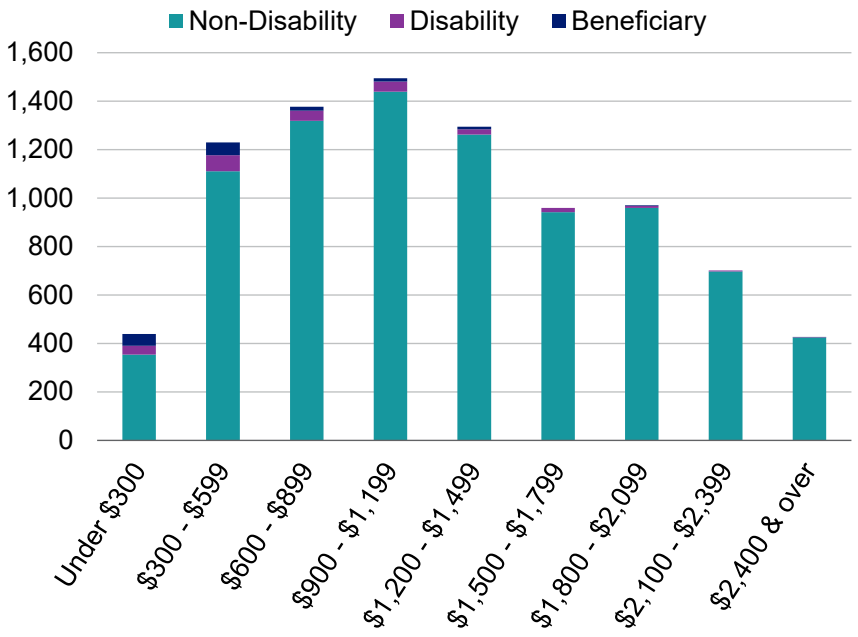
[1] Tier 2 employees are those employees hired on or after October 1, 2005.

Retired members and beneficiaries

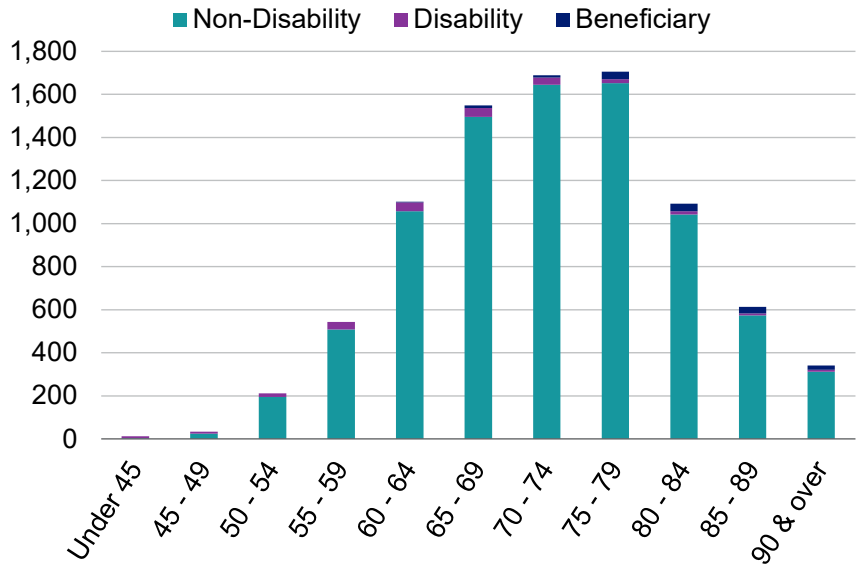
As of September 30,	2022	2021	Change
Retirees	8,755	8,639	1.3%
Average age	72.3	72.1	0.2
Average semi-monthly benefit amount	$1,268	$1,259	0.7%
Beneficiaries	144	144	0.0%
Total semi-monthly amount	$11,175,854	$10,950,432	2.1%

Distribution of Retired Members and Beneficiaries as of September 30, 2022

By Type and Semi-Monthly Amount



By Type and Age



Historical plan population

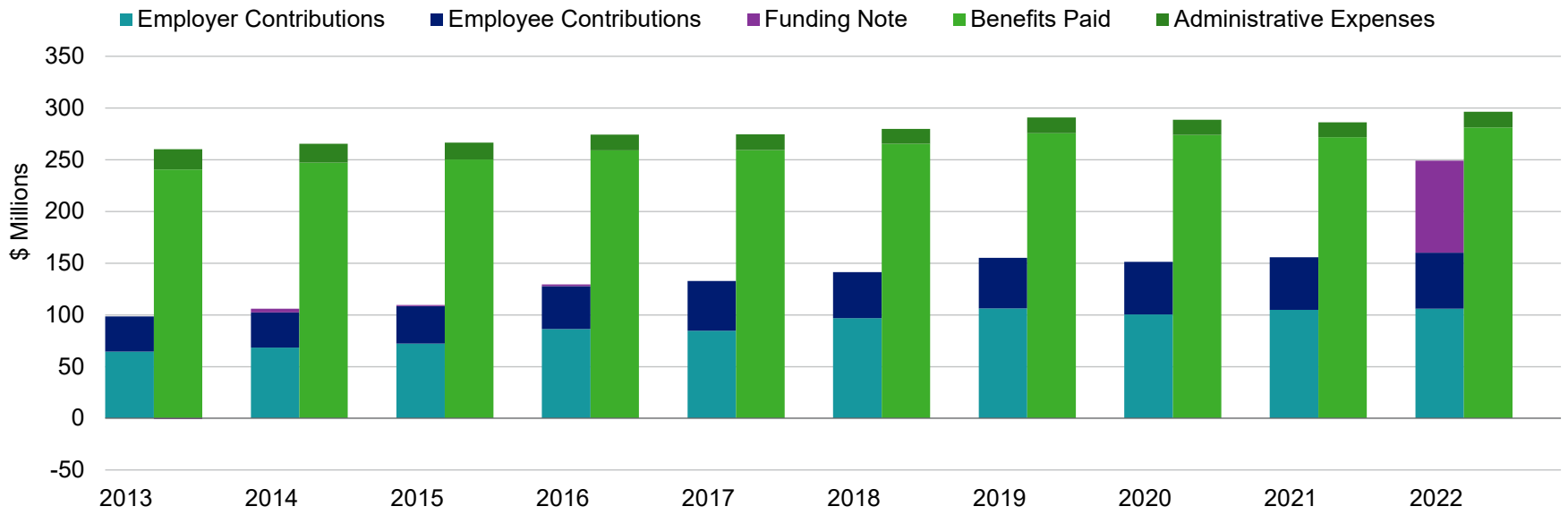
Participant Data Statistics: 2001 - 2022

	Active Participants			Retired Members and Beneficiaries		
Year Ended September 30	Count	Average Age	Average Credited Service	Count	Average Age	Average Semi-Monthly Amount
2001	9,303	44.4	13.3	5,581	66.2	$826
2003	10,037	45.2	14.5	6,093	67.3	863
2006	10,739	45.1	14.0	7,282	68.6	928
2011	10,376	45.7	13.9	7,592	69.4	1,104
2013	9,393	46.3	14.6	8,024	69.5	1,157
2014	9,227	46.2	14.4	8,465	69.7	1,168
2015	9,303	46.5	14.7	8,465	70.1	1,182
2016	9,499	46.3	14.5	8,520	70.5	1,192
2017	9,448	46.6	14.6	8,592	71.1	1,197
2018	9,368	46.8	14.5	8,702	71.2	1,210
2019	8,736	46.9	14.5	8,761	71.6	1,222
2020	8,804	46.9	14.3	8,792	71.9	1,235
2021	8,928	46.8	13.0	8,783	72.2	1,247
2022	8,712	46.7	12.7	8,899	72.4	1,256

Financial information

- Retirement plan funding anticipates that, over the long term, both contributions and investment earnings (less investment fees) will be needed to cover benefit payments and administrative expenses. Retirement plan assets change as a result of the net impact of these income and expense components.
- For each of the ten plan years, benefit payments and expenses have been significantly higher than contribution income. However, for the year ended September 30, 2022, that gap between income and expenses decreased significantly due to the receipt of the first funding note payment.
- Additional financial information, including a summary of transactions for the valuation year, is presented in Section 3, Exhibits C and D.

Comparison of Contributions Made with Benefits and Expenses Paid
for Years Ended September 30, 2013 - 2022

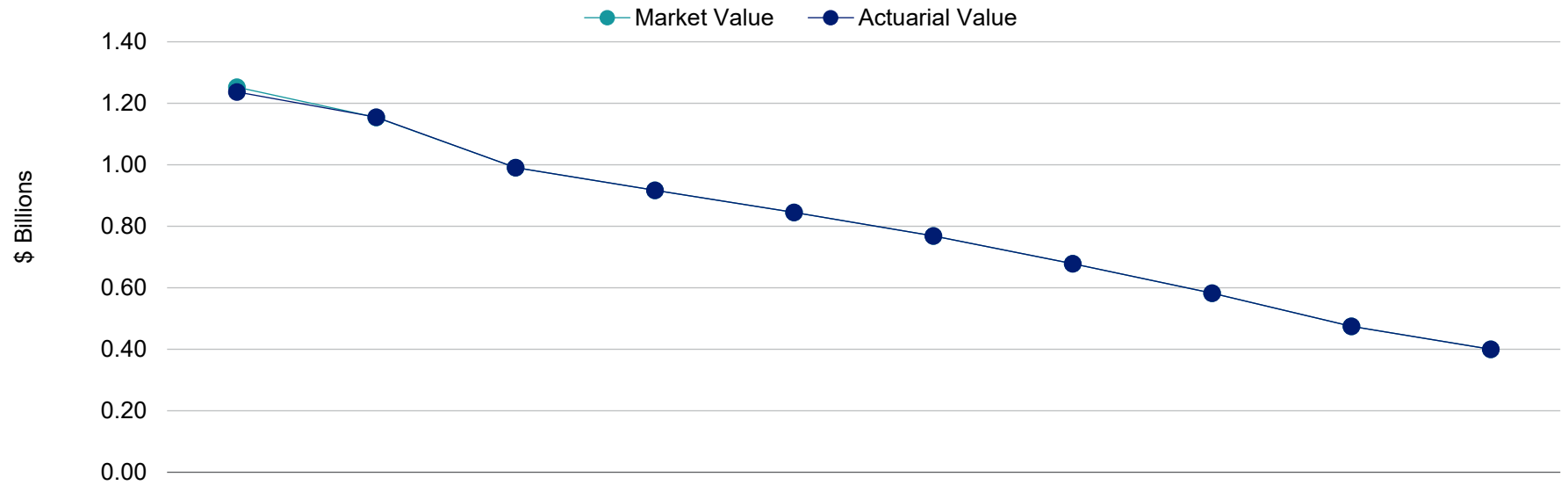


Asset history for years ended September 30

The actuarial value is a representation of the System's financial status. The actuarial asset value is significant because the Plan's liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

Effective October 1, 2015, the actuarial value is equal to the market value of assets. Once the short-term cash flow issues have been addressed, it is recommended that the Board review different asset valuation methods and consider using a method that provides more level and stable long-term costs.

Actuarial Value of Assets vs Market Value of Assets

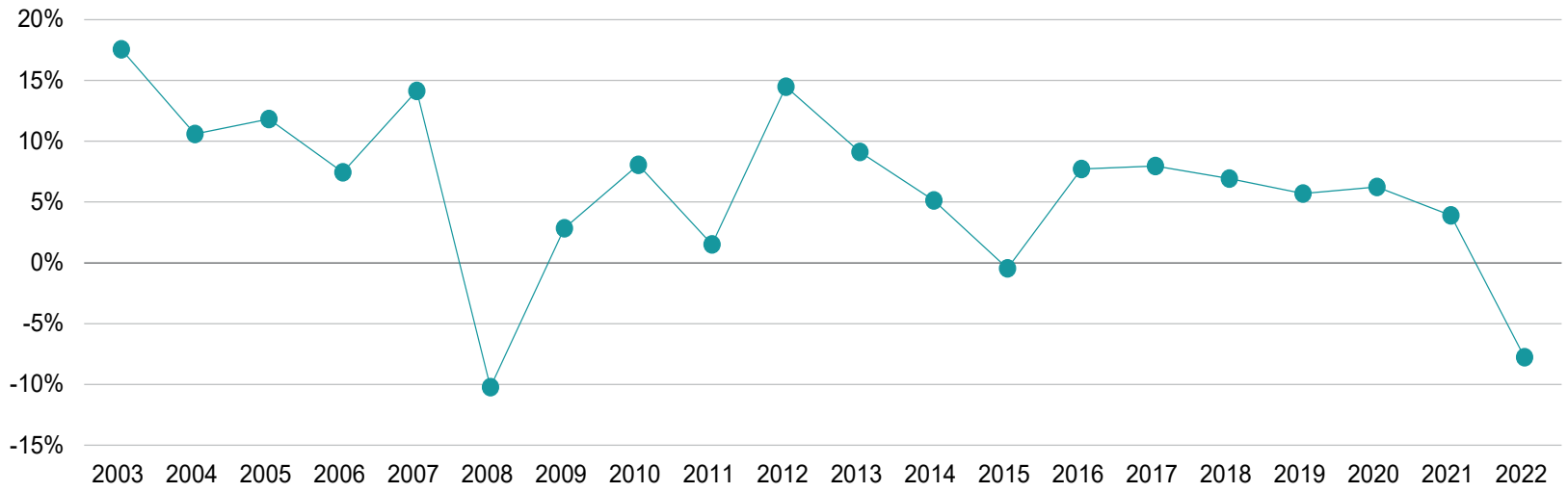


	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actuarial value[1]	$1.24	$1.15	$0.99	$0.92	$0.85	$0.77	$0.68	$0.58	$0.48	$0.40
Market value[1]	1.25	1.15	0.99	0.92	0.85	0.77	0.68	0.58	0.48	0.40

[1] In billions

Historical investment returns

Market Rates of Return for Years Ended September 30, 2003 - 2022



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market rate	17.6%	10.6%	11.8%	7.5%	14.1%	-10.2%	2.9%	8.1%	1.5%	14.5%	9.1%	5.1%	-0.5%	7.7%	8.0%	6.9%	5.7%	6.2%	3.9%	-7.8%
Assumed rate	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	7.5%	7.5%	7.5%	7.5%	7.0%	7.0%	7.0%	7.0%	4.0%	4.0%	4.0%

Average Market Value Rates of Return

September 30, 2003 – September 30, 2022	6.5%
September 30, 2003 – September 30, 2007	12.1%
September 30, 2009 – September 30, 2022	5.7%

Actuarial experience

Assumptions should consider experience and should be based on reasonable expectations for the future. Each year actual experience is compared to that projected by the assumptions. Differences are reflected in the actuarial valuation.

Assumptions are not changed if experience is believed to be a short-term development that will not continue over the long term. On the other hand, if experience is expected to continue, assumptions are changed.

Actuarial Experience for Year Ended September 30, 2022

1	Net loss from investments[1]	-$53,531,778
2	Net loss from administrative expenses	-200,431
3	Net gain from other experience	48,029,070
4	Net experience loss: **1 + 2 + 3**	-$5,703,139

[1] Details on next page

Investment experience

Actuarial planning is long term. The obligations of a pension plan are expected to continue for the lifetime of all its participants.

The assumed long-term rate of return for the year ended September 30, 2022 was 4.00%. Since the actual return for the year was less than the assumed return, the Plan experienced an actuarial loss during the year ended September 30, 2022 with regard to its investments.

The investment return assumption was revised with this valuation to 6.00% following an experience study completed and presented at the July 2023 Board Retreat. The new assumption considers past experience, the asset allocation policy of the Board and future expectations.

The asset allocation policy was revised in response to the System's immediate solvency issues being delayed due to the receipt of the funding note revenue over the next several years. We will continue to monitor the investment return assumption in relation to the asset allocation policy and the expected time horizon of the plan.

Investment Experience

		Year Ended September 30, 2022
1	Net investment income	-$35,316,275
2	Average value of assets	455,387,587
3	Rate of return: **1 ÷ 2**	-7.76%
4	Assumed rate of return	4.00%
5	Expected investment income: **2 x 4**	18,215,503
6	Investment gain/(loss): **1 - 5**	-$53,531,778

Non-investment experience

Administrative expenses

Administrative expenses for the year ended September 30, 2022 totaled $15,196,848, as compared to the assumption of $15,000,000. This resulted in an experience loss of $200,431 for the year, including an adjustment for interest.

Other experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- Mortality experience (more or fewer than expected deaths)
- The extent of turnover among participants
- Retirement experience (earlier or later than projected)
- The number of disability retirements (more or fewer than projected)
- Salary increases (greater or smaller than projected)

Another difference may be a significant change in the participant data or changes resulting from valuing the potential liability for current inactive vested members that may be eligible for future benefits.

The net gain from this other experience for the year ended September 30, 2022 amounted to $48,029,070, which is 1.0% of the actuarial accrued liability and is not considered significant.

Actuarial assumptions

- Based on the Actuarial Experience Study for the five-year period October 1, 2017 to September 30, 2022 presented at the July 2023 Board Retreat, the following assumption changes were adopted effective September 30, 2022:
  - The funding investment return assumption was increased to 6.00%, previously 4.0%.
  - The salary scale assumption was revised to 5.00% for the next five plan years and 4.00% thereafter.
  - The mortality assumption for healthy lives was revised to the Pub-2010 General Below-Median Amount-Weighted Employee and Healthy Annuitant Mortality Tables (95% load for Males) with generational projection using Scale MP-2021.
  - The disabled mortality assumption was revised to the Pub-2010 Non-Safety Amount-Weighted Disabled Annuitant Mortality Table with generational projection using Scale MP-2021.
  - The active retirement rate assumption for Regular and Public Safety members was revised at select ages based on recent plan experience. No change was made for judges and members of the legislature.
  - The withdrawal assumption was revised to 3.5% for those with service below 9 years, and the rates based on the SOA Basic Age Turnover Rate Table for those with over 9 years of service.
- In addition to the changes noted above, the administrative expense assumption was increased to $15,250,000 for the year beginning October 1, 2022 based on the final audited financial statement received from the Fund Auditor.
- These changes decreased the actuarial accrued liability by 17.4% and decreased the normal cost by 42.7%. In addition, the actuarially determined contribution decreased from $361.8 million, or 83.5% of pay, to $312.0 million, or 72.0% of pay, as a result of the changes.
- Details on actuarial assumptions and methods are in Section 4, Exhibit I.

Plan provisions

- There were no changes in plan provisions since the prior valuation.
- A summary of plan provisions is in Section 4, Exhibit II.

Contribution rates

- There were no changes in employer or employee contribution rates since the prior valuation.

Unfunded actuarial accrued liability

Development of Unfunded Actuarial Accrued Liability for Year Ended September 30, 2022

1	Unfunded actuarial accrued liability at beginning of year		$4,369,141,545
2	Normal cost at beginning of year including administrative expenses		94,670,055
3	Total contributions		-249,254,613
4	Interest on 1, 2 & 3		173,567,371
5	Expected unfunded actuarial accrued liability		$4,388,124,358
6	Changes due to:		
	(a) Net experience loss	$5,703,139	
	(b) Changes in assumptions	-834,701,939	
	Total changes		-$828,998,800
7	Unfunded actuarial accrued liability at end of year		$3,559,125,558

Actuarially determined contribution

The actuarially determined contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. As of September 30, 2023, the actuarially determined contribution is $363,519,915, or 83.9% of projected payroll.

The Board has previously set the funding policy used to calculate the ADEC based on a fixed open amortization period of 20 years.

The ADEC for the fiscal year ending September 30, 2023 is based on the data previously described, the actuarial assumptions and plan provisions described in Section 4, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in actuarial assumptions.

Actuarially Determined Contribution for Year Ending September 30

		2023		2022	
		Amount	% of Projected Payroll	Amount	% of Projected Payroll
1	Normal cost	$44,760,185	10.33%	$79,984,427	18.62%
2	Administrative expenses (beginning of year)	14,778,267	3.41%	14,685,628	3.42%
3	Employer normal cost: (1) + (2)	59,538,452	13.74%	94,670,055	22.04%
4	Actuarial accrued liability	3,959,456,549		4,844,269,452	
5	Actuarial value of assets	400,330,991		475,127,907	
6	Unfunded actuarial accrued liability: (4) - (5)	3,559,125,558		4,369,141,545	
7	Payment on unfunded actuarial accrued liability	292,736,590	67.58%	309,124,118	71.98%
8	Adjustment for timing[1]	11,244,873	2.60%	8,643,946	2.01%
9	Actuarially determined contribution: (3) + (7) + (8)	$363,519,915	83.92%	$412,438,119	96.03%
10	Projected employer contribution	101,797,530	23.50%	100,927,291	23.50%
11	Projected member contribution	51,561,819	11.90%	50,666,368	11.80%
12	Funding Note	157,996,500	36.47%	89,198,738	20.77%
13	Total expected contributions: (10) + (11) + (12)	311,355,849	71.88%	240,792,397	56.07%
14	Actuarially determined employer contribution: (9) – (11)	$311,958,096	72.02%	$361,771,924	84.24%
15	Shortfall: (14) – (10) – (12)	52,164,066	12.04%	171,645,895	39.97%
16	Projected payroll	$433,180,978		$429,477,835	

[1] Actuarially determined contributions are assumed to be paid on a monthly basis.

Reconciliation of actuarially determined employer contribution

The chart below details the changes in the actuarially determined employer contribution from the prior valuation to the current year's valuation.

Reconciliation of Actuarially Determined Employer Contribution from Fiscal Year Ending September 30, 2022 to September 30, 2023

		Amount	% of Payroll
1	Actuarially determined employer contribution for year ending September 30, 2022	$361,771,924	84.24%
2	Effect of open amortization period	-11,033,587	-2.55%
3	Effect of contribution less than actuarially determined employer contribution	12,391,082	2.86%
4	Effect of investment loss	4,002,968	0.92%
5	Effect of other gains and losses on accrued liability	-3,576,502	-0.83%
6	Net effect of other changes, including composition and number of members	-1,737,595	-0.40%
7	Change due to changes in assumptions	-50,110,194	-11.57%
8	Change due to change in administrative expense assumption	250,000	0.06%
9	Total change	-49,813,828	-11.51%
10	Total change in percentage due to compensation change		-0.72%
11	Actuarially determined employer contribution for year ending September 30, 2023	$311,958,096	72.02%

History of employer contributions

History of Employer Contributions: 2004 – 2023

Fiscal Year Ended September 30	Actuarially Determined Employer Contribution (ADEC)[1]	Actual Employer Contributions	Percent Contributed
2004	$108,358,399	$54,084,454	50%
2005[3]	120,184,848	51,542,030	43%
2006[3]	131,059,471	65,061,430	50%
2007	137,797,268	60,778,382	44%
2008[3]	138,488,871	75,871,146	55%
2009[3]	147,490,851	80,177,004	54%
2010[3]	157,817,709	77,004,630	49%
2011[3]	162,841,336	80,849,762	50%
2012	178,644,349	66,677,155	37%
2013[3]	172,439,842	64,431,322	37%
2014	189,715,251	68,298,617	36%
2015	200,089,791	72,287,934	36%
2016	247,158,137	86,346,838	35%
2017	250,574,023	84,802,335	34%
2018	267,743,116	96,747,868	36%
2019	277,523,563	106,184,026	38%
2020	365,803,372	100,422,478	27%
2021	373,748,689	104,844,144	28%
2022	361,771,924	195,081,835[2]	54%
2023	311,958,096	Not yet available	Not yet available

[1] The ADEC is the actuarially determined contributions, net of projected member contributions.

[2] Includes payments made from the GERS Funding Note.

[3] Estimated based on prior year's actuarial valuation.

Risk

The actuarial valuation results are dependent on a given set of assumptions and data as of a specific date; however, there is a risk that emerging results may differ significantly as actual experience proves to be different from the current assumptions.

For each of the past several years, we have provided sensitivity and scenario projections to highlight the impact of varying investment returns, lower employment levels, changes in contribution requirements and plan design including potential benefit reductions. These risk assessments and projections are important for the Board because:

- The System's assets are projected to decline as benefit and expense outflow is greater than contribution and expected investment income, even after reflecting the expected revenue from the GERS funding note.
- They provide the Board with possible recommendations to the Governor and the Legislature on potential changes in the plan of benefits and additional contributions required for the System to remain solvent in the short-term and long-term, and
- The outlook for financial markets, future employment level and the economic activity in the US Virgin Islands is uncertain.

Some examples of risks that may affect the System include:

- Investment Risk (the risk that returns will be different than expected)

  If the plan earns the assumed return on assets of 6.0% for all future years and reflecting the GERS Funding Note, assets are projected to decline and the plan is projected to become temporarily insolvent during the years ending September 30, 2037 and 2038, increasing for each year after that.

  If the plan earns an annual 5.0% return on assets for all future years, the plan is projected to become temporarily insolvent during the years ending September 30, 2035 through 2038, increasing for each year after that.

  The market value rate of return over the last 20 years has ranged from a low of -10.23% to a high of 17.55%.

- Longevity Risk (the risk that mortality experience will be different than expected)

  The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.

- Employment level and Contribution Risk (the risk that actual contributions and employment levels will be less than expected)

  Projected contributions include expected bond revenue through September 30, 2052 based on anticipated amounts. If actual amount received are less than expected it may impact the solvency of the System.

- Demographic Risk (the risk that participant experience will be different than assumed)

  Examples of this risk include:

  – Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply. While it is difficult to quantify the impact of potential experience, earlier retirements would generally result in higher costs for your plan.

  – More or less active participant turnover than assumed.

- Actual Experience Over the Last 20 years and Implications for the Future

  Past experience can help demonstrate the sensitivity of key results to the Plan's actual experience. Over the past 20 years

  – The Plan's funding policy requires payment for the ADEC. As indicated in this report, the amounts contributed have been significantly less than the ADEC (see Section 2: History of Employer Contributions) for at least the past 20 years. As a result, the ADEC has increased over that period from 35% of pay in 2007 to 72.0% of pay as of September 30, 2022.

  – The historical and continuing shortfall in the contributions to the System has resulted in increasingly more negative cash flow, declining assets, increasing unfunded actuarial liabilities and as noted above, a potential projected insolvency, if additional measures are not taken.

- Maturity Measures

  As pension plans mature, the cash needed to fulfill benefit obligations will increase over time. For the prior year, benefits paid and expenses were $39.5 million more than contributions and other income received.

Actuarial balance sheet

An overview of the Plan's funding is given by an Actuarial Balance Sheet. In this approach, first the amount and timing of all future payments that will be made by the Plan for current participants is determined. Then these payments are discounted at the valuation interest rate to the date of the valuation, thereby determining the present value, referred to as the "liability" of the Plan.

Second, this liability is compared to the assets. The "assets" for this purpose include the net amount of assets already accumulated by the Plan, the present value of future member contributions, the present value of future employer normal cost contributions, and the present value of future employer amortization payments for the unfunded actuarial accrued liability.

Actuarial Balance Sheet

	Year Ended	
	September 30, 2022	**September 30, 2021**
Liabilities		
Present value of benefits for retired participants and beneficiaries	$2,595,711,649	$2,970,059,611
Present value of benefits for inactive vested participants	129,591,387	225,028,471
Present value of benefits for active participants	1,548,468,530	2,356,563,673
Total liabilities	$4,273,771,566	$5,551,651,755
Assets		
Total valuation value of assets	$400,330,991	$475,127,907
Present value of future contributions by members	389,006,160	515,793,768
Present value of future employer contributions for:		
Entry age normal cost	-74,691,143	191,588,535
Unfunded actuarial accrued liability	3,559,125,558	4,369,141,545
Total of current and future assets	$4,273,771,566	$5,551,651,755

Section 3: Supplemental Information

Exhibit A: Table of plan demographics

Category	Year Ended September 30 2022	2021	Change From Prior Year
Active members in valuation:			
Number	8,712	8,928	-2.4%
Average age	46.7	46.8	-0.1
Average years of credited service	12.7	13.0	-0.3
Total payroll	$433,180,978	$429,477,835	0.9%
Average payroll	$49,722	$48,105	3.4%
Total active vested participants	4,507	4,862	-7.3%
Retired members:			
Number in pay status	8,755	8,639	1.3%
Average age	72.3	72.1	0.2
Average semi-monthly benefit	$1,268	$1,259	0.7%
Beneficiaries:			
Number in pay status	144	144	0.0%
Average age	81.4	80.8	0.6
Average semi-monthly benefit	$537	$530	1.3%

Exhibit B: Members in active service as of September 30, 2022 by age, years of credited service, and average compensation

Age	Total	Less than 5	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	272	272	- -	- -	- -	- -	- -	- -	- -	- -
	$40,006	$40,006	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	685	635	50	- -	- -	- -	- -	- -	- -	- -
	43,458	43,512	$42,777	- -	- -	- -	- -	- -	- -	- -
30 - 34	824	580	195	47	2	- -	- -	- -	- -	- -
	45,730	44,713	47,277	$51,205	$61,244	- -	- -	- -	- -	- -
35 - 39	911	400	223	197	78	13	- -	- -	- -	- -
	48,170	46,244	47,656	50,369	53,674	$49,909	- -	- -	- -	- -
40 - 44	961	292	139	192	214	111	13	- -	- -	- -
	50,004	45,644	48,787	50,862	53,507	54,325	$53,718	- -	- -	- -
45 - 49	1,191	265	113	170	207	277	130	29	- -	- -
	52,350	47,825	48,341	50,358	53,798	55,975	57,168	$54,456	- -	- -
50 - 54	1,378	242	110	177	164	259	278	137	11	- -
	52,323	47,454	46,914	48,684	50,190	54,307	57,007	58,989	$55,825	- -
55 - 59	1,256	256	92	128	136	197	212	175	47	13
	51,867	46,675	47,712	48,828	48,513	52,185	56,241	58,271	59,534	$58,424
60 - 64	827	141	67	118	118	103	92	85	75	28
	50,426	46,277	49,145	47,174	46,475	50,774	53,413	55,339	59,078	55,554
65 - 69	271	60	23	34	41	36	23	23	16	15
	51,349	45,900	50,605	53,436	46,581	49,998	56,499	59,572	58,103	58,126
70 & over	121	20	15	17	11	18	11	10	8	11
	58,407	46,666	64,948	47,881	48,528	72,552	56,324	53,398	85,611	60,685
Unknown	15	15	- -	- -	- -	- -	- -	- -	- -	- -
	42,076	42,076	- -	- -	- -	- -	- -	- -	- -	- -
Total	8,712	3,178	1,027	1,080	971	1,014	759	459	157	67
	$49,722	$45,066	$47,916	$49,741	$51,135	$54,108	$56,303	$57,660	$60,239	$57,529

Exhibit C: Summary statement of income and expenses on a market value basis

	Year Ended September 30, 2022		Year Ended September 30, 2021	
Net assets at market value at the beginning of the year		$475,127,907		$582,539,738
Contribution income:				
• Employer contributions	$105,883,097		$104,844,144	
• Employee contributions	54,172,778		50,991,005	
• Funding Note	89,198,738		0	
Total contribution income		*$249,254,613*		*$155,835,149*
Other income		$7,695,671		$2,664,549
Investment income:				
• Interest, dividends and other income	$5,007,220		$6,261,293	
• Asset appreciation	-39,939,665		14,452,152	
• Less investment fees	-383,830		-465,888	
Net investment income		*-$35,316,275*		*$20,247,557*
Total income available for benefits		**$221,634,009**		**$178,747,255**
Less benefit payments and administrative expenses:				
• Benefits paid to members	-$272,153,568		-$265,175,454	
• Refunds to member's contributions	-9,080,509		-6,700,985	
• Administrative expenses	-15,196,848		-14,282,647	
Total benefit payments and administrative expenses		*-$296,430,925*		*-$286,159,086*
Change in reserve for future benefits		**$74,796,916**		**-$107,411,831**
Net assets at market value at the end of the year		**$400,330,991**		**$475,127,907**

Exhibit D Development of the fund through September 30, 2022

Year Ended September 30	Employer Contributions	Employee Contributions	Funding Note	Other Income	Net Investment Return[1]	Admin. Expenses	Benefit Payments	Actuarial Value of Assets at Year-End[2]
2013	$64,431,322	$34,090,376	- -	-$783,854[3]	$72,583,326	$19,581,770	$240,564,834	$1,237,213,473
2014	68,298,617	34,020,107	- -	3,573,611	77,187,305	18,494,773	247,069,503	1,154,728,837
2015	72,287,934	36,245,015	- -	1,161,300	-6,869,8603	16,401,721	250,110,255	991,041,251
2016	86,346,838	41,459,511	- -	1,599,307	70,993,934	15,267,630	259,011,168	917,162,043
2017	84,802,335	47,925,193	- -	2,641,472	67,401,361	14,997,033	259,464,878	845,470,493
2018	96,747,868	44,481,827	- -	7,880,224	54,077,199	14,505,786	265,331,162	768,820,663
2019	106,183,907	49,035,132	- -	4,820,140	40,161,690	15,162,645	275,738,622	678,120,265
2020	100,422,478	50,861,064	- -	3,642,816	38,093,939	14,688,038	273,912,786	582,539,738
2021	104,844,144	50,991,005	- -	2,664,549	20,247,557	14,282,647	271,876,439	475,127,907
2022	105,883,097	54,172,778	$89,198,738	7,695,671	-35,316,275	15,196,848	281,234,077	400,330,991

[1] Net of investment fees
[2] Effective in 2015, the actuarial value of assets is equal to market value of assets.
[3] Includes an adjustment due to restatement from draft financial statements

Exhibit E: Table of amortization bases

Type	Annual Payment	Years Remaining	Outstanding Balance
Prior to issuance of GERS Funding Note	$383,536,431	20	$4,663,080,607
After issuance of GERS Funding Note	-90,799,841	20	-1,103,955,049
Total	**292,736,590**		**3,559,125,558**

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial assumptions, methods and models

Rationale for Assumptions	The assumptions and methods used in this valuation are based on the results of the Actuarial Experience Study as of September 30, 2022 for the five-year period October 31, 2017 through September 30, 2022, with the net investment return assumption updated for the September 30, 2022 valuation based on the asset allocation policy at that time. All assumptions were approved by the Board of Trustees. Current data is reviewed in conjunction with each annual valuation. Assumption changes are listed at the end of this exhibit.
Net Investment Return	6.00%. The net investment return assumption is an estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes as provided by Segal Marco Advisors as well as the System's target asset allocation over the System's expected horizon period.
Salary Increases	5.00% per year for the plan years ending 2022-2026, and 4.00% thereafter
Mortality Rates	*Healthy*: Pub-2010 General Below-Median Amount-Weighted Employee and Healthy Annuitant Mortality Tables (95% load for Males) with generational projection using Scale MP-2021. *Disabled*: Pub-2010 Non-Safety Amount-Weighted Disabled Annuitant Mortality Table with generational projection using Scale MP-2021. *Contingent Survivors*: Pub-2010 General Below-Median Amount-Weighted Contingent Survivor Mortality Table with generational projection using Scale MP-2021. The underlying tables with generational projection to the ages of members as of the measurement date reasonably reflect the mortality experience of the System as of the measurement date. These mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

Section 4: Actuarial Valuation Basis

Termination Rates Before Retirement

Age	Rate (%)		
	Disability		Withdrawal[1]
	Regular	Public Safety	Regular and Public Safety
20	0.03	0.05	17.46
25	0.03	0.05	18.51
30	0.03	0.05	12.19
35	0.03	0.06	8.78
40	0.05	0.09	7.00
45	0.09	0.18	6.21
50	0.20	0.40	5.63
55	0.43	0.85	2.92
60	0.87	1.74	2.20

[1] Withdrawal rates do not apply at or beyond early retirement age. For those with under 9 years of service, a flat rate of 3.50%

No withdrawal and disability rates assumed for judges and legislature members.

Retirement Rates for Active Participants

Retirement Rates for Regular Members (%)

Age	<30 Years of Service	>=30 Years of Service	Age	<30 Years of Service	>=30 Years of Service
50-58	3.0	15.0	65	15.0	35.0
59	8.0	15.0	66	25.0	30.0
60-61	10.0	18.0	67-70	20.0	30.0
62-63	12.5	28.0	71 & older	100.0	100.0
64	12.5	30.0			

Retirement Rates for Public Safety Members (%)

Age	Rate	Age	Rate
<50 with at least 20 years of service	7.5	61	15.0
50 – 58	7.5	62-64	20.0
59	15.0	65 & older	100.0
60	10.0		

Judges: 100% at earlier of age 50 with at least 20 years of service or age 70 with at least six years of service.

Legislature: 100% at earlier of any age with at least 20 years of service or age 60 with at least six years of service.

Section 4: Actuarial Valuation Basis

Retirement Age for Inactive Vested Participants	65
Unknown Data for Members	Same as those exhibited by members with similar known characteristics. If not specified, members are assumed to be male.
Adjustment to Inactive Vested Data	Service information for inactive vested participants was determined based on dates of hire and termination, if available. If not available, inactive vested participants were assumed to have ten years of service as of the valuation date. Vested benefit amounts were estimated based on participant's salary and assumed service. If salary is unknown, salary is assumed to be the same as that for individuals with similar characteristics and known salary.
Percent Married	80%
Age of Spouse	Females three years younger than males
Benefit Election	All participants are assumed to elect the single life annuity form of payment
Administrative Expenses	$15,250,000 payable monthly for the year beginning October 1, 2022
Actuarial Value of Assets	At market value
Actuarial Cost Method	Entry Age Normal Actuarial Cost Method. Entry Age is the age at the time the participant commenced employment, based on the dater of hire provided by the Fund Office. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated as a level percent of salary with Normal Cost determined as if the current benefit accrual rate of the participant's job category and tier of benefits had always been in effect.
Models	Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.
Justification for changes in actuarial assumptions	Based on past experience and future expectations, the following actuarial assumptions were changed effective with this valuation: Net investment return, previously 4.0% Salary increases, previously 3.25% per year Administrative expenses, previously $15.0 million

Mortality for healthy and contingent survivor lives, previously 110% of the RP-2014 Blue Collar Employee and Healthy Annuitant Mortality Tables with generational projection from 2015 using Scale MP-2015

Mortality for disabled lives, previously 125% of the RP-2014 Disabled Annuitant Mortality Tables with generational projection from 2015 using Scale MP-2015

Termination rates for regular and public safety members, previously rates based on age as shown below:

Age	Termination Rate (%)[1]
20	3.97
25	3.86
30	3.61
35	3.14
40	2.58
45	1.99
50	1.88
55	0.47
60	0.05

[1] Withdrawal rates do not apply at or beyond early retirement age.

Retirement rates for Regular members, previously rates based on age and service as shown below:

Retirement Rates for Regular Members (%)					
Age	<30 Years of Service	>=30 Years of Service	Age	<30 Years of Service	>=30 Years of Service
50-59	3	15	66	7	25
60-61	10	20	67-68	7	15
62-63	10	35	69-70	15	50
64	10	25	71 & older	100	100
65	20	25			

Retirement rates for Public Safety members, previously rates based on age and service as shown below:

Retirement Rates for Public Safety Members (%)			
Age	Rate	Age	Rate
<50 with at least 20 years of service	10	55 - 59	10
50 - 51	5	60	40
52	15	61 - 64	20
53 - 54	5	65 & older	100

Exhibit II: Summary of plan provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year	October 1 through September 30	
Plan Status	Ongoing	
Service Pension:		
Regular Employees		
Tier 1	Eligibility	60 with 10 years of service or any age with 30 years of service
	Amount	2.5% of Final Average Salary[1] per year of service up to 100%
Tier 2	Eligibility	65 with 10 years of service
	Amount	1.75% of Career Average Salary[1] per year of service up to 100%
Public Safety Employees		
Tier 1	Eligibility	55 with 10 years of service or any age with 20 years of service
	Amount	3.0% of Final Average Salary[1] per year of service up to 90%
Tier 2	Eligibility	60 with 10 years of service or age 58 with 25 years of service
	Amount	1.75% of Career Average Salary[1] per year of service under 20 years and 2.10% of Career Average Salary[1] per year of service for service greater than or equal to 20 years, up to 90%
Legislature		
Tier 1	Eligibility	50 with 6 years of service or any age with 20 years of service
	Amount	2.5% of highest compensation for years 1-6 3.0% of highest compensation for years 7-12 4.0% of highest compensation for years above 12, up to a maximum of 75%
Tier 2	Eligibility	60 with 6 years of service
	Amount	3.5% of highest compensation for years 1-6 4.0% of highest compensation for years 7-12 4.5% of highest compensation for years 13-20 5.0% of highest compensation for years above 20, up to a maximum of 100%

[1] Final Average Salary for Regular and Public Safety Employees is based on the average of the highest annual salary up to a maximum of $65,000 for any five years in the last 10 years. Career Average Salary is also limited to a maximum of $65,000 for each year of service.

Section 4: Actuarial Valuation Basis

Judges	Eligibility	50 with 6 years of service
	Amount	5% of highest compensation per year of service up to 100%
Early Retirement:		
Regular Employees		
Tier 1	Eligibility	50 with 10 years of service
	Amount	Service Pension reduced 3.9% per year less than age 60
Tier 2	Eligibility	60 with 10 years of service
	Amount	Service Pension reduced 3.9% per year less than age 65
Public Safety Employees		
Tier 1	Eligibility	50 with 10 years of service
	Amount	Service Pension reduced 3.9% per year less than age 55
Tier 2	Eligibility	55 with 10 years of service
	Amount	Service Pension reduced 3.9% per year less than age 60
Disability:		
Duty Connected Disability	Eligibility	Total and permanent disability as a result of performance of duty
	Amount	Tier 1: 75% of salary (not to exceed $65,000) less workers compensation Tier 2: 52.5% of salary (not to exceed $65,000) less workers compensation
Non-Duty Connected Disability	Eligibility	9 years of service and total and permanent disability
	Amount	Tier 1: 2.0% of Final Average Salary[1] per year of service up to 60%, 20% minimum Tier 2: 1.4% of Final Average Salary[1] per year of service up to 42%, 14% minimum
Vesting	Eligibility	10 years of service and leave contributions in System
	Amount	Service pension accrued at termination
Severance Benefit	Amount	Refund of contributions with 4% annual interest, if no other benefits payable.

[1] Final Average Salary for Regular and Public Safety Employees is based on the average of the highest annual salary up to a maximum of $65,000 for any five years in the last 10 years. Career Average Salary is also limited to a maximum of $65,000 for each year of service.

Section 4: Actuarial Valuation Basis

Post-Retirement COLA:		
Disabled pensioners	1% of the original retirement benefit each year up to age 60, 1.5% thereafter.	
Pensioners and Survivor annuitants	None	
Pre-Retirement Death Benefits:		
Duty Connected Death	Eligibility	Death in service as a result of performance of duty
	Amount	Tier 1: Annuity of 40% of salary in effect on date of death to widow plus 10% of salary for each child up to age 18 to a maximum family benefit of 60% of salary. If no widow, 10% of salary is payable on behalf of each child under age 18 to a maximum family benefit of 50%. If no widow or children, each dependent parent is entitled to 25% of salary. Tier 2: Annuity of 28% of salary in effect on date of death to widow plus 7% of salary for each child up to age 18 to a maximum family benefit of 42% of salary. If no widow, 7% of salary is payable on behalf of each child under age 18 to a maximum family benefit of 35%. If no widow or children, each dependent parent is entitled to 17.5% of salary.
Non-Duty Connected Death	Eligibility	Death in service
	Amount	Accumulated contributions of deceased member to designated beneficiary. Tier 1: If, at the time of death, the member was eligible for a service or early retirement annuity, the surviving spouse, if any, can elect a 100% survivor annuity based on the benefit which would have been payable to the member had he/she retired the date before he/she died.
Post-Retirement Death Benefits	Lump-sum Benefit	Lump sum payment equal to the excess of the sum of contributions plus annual salary at retirement (maximum $10,000) over the total of benefits paid
	Husband and Wife	If married, pension benefits are paid in the form of a joint and survivor annuity unless this form is rejected by the participant and spouse. If not rejected, the benefit amount otherwise payable is reduced to reflect the joint and survivor coverage. If rejected, or if not married, benefits are payable for the life of the employee, or in any other available optional form elected by the employee in an actuarially equivalent amount.
Optional Forms of Benefits	50% or 100% joint-and-survivor annuity	
Changes in Plan Provisions	There have been no major changes in plan provisions since the last valuation.	

Exhibit III: Contribution rates

Employer Contribution Rates	23.5% of payroll, effective January 1, 2020 20.5% of payroll, effective January 1, 2015
Employee Contribution Rates	Percent of payroll effective January 1, 2017
Tier 1	
Regular Employees	11%
Public Safety Employees	13%
Legislature	12%
Judges	15%
Tier 2	
Regular Employees	11.5%
Public Safety Employees	13.625%
Legislature	14%
Judges	15%

Section 5: GASB Information

Exhibit 1: Net Pension Liability

The components of the net pension liability at September 30, 2022 were as follows:

Total Pension Liability	$4,491,404,535
Plan Fiduciary Net Position	400,330,991
Net Pension Liability	$4,091,073,544
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	8.91%

Actuarial assumptions. The Total Pension Liability (TPL) as of September 30, 2022, which was determined based on the results of an actuarial valuation as of September 30, 2022, used the following actuarial assumptions, applied to all periods included in the measurement:

Inflation	2.50%
Salary increases	5.00% per year for the plan years ending 2022-2026, and 4.00% thereafter (previously, 3.25%)
Net investment rate of return	4.77%, net of pension plan investment expense, including inflation

Mortality rates for healthy lives are based on Pub-2010 General Below-Median Amount-Weighted Employee and Healthy Annuitant Mortality Tables (95% load for Males) with generational projection using Scale MP-2021. Mortality for disabled lives are based on Pub-2010 Non-Safety Amount-Weighted Disabled Annuitant Mortality Table with generational projection using Scale MP-2021. Mortality rates for contingent survivors lives are based on Pub-2010 General Below-Median Amount-Weighted Contingent Survivor Annuitant Mortality Table with generational projection using Scale MP-2021.

The demographic assumptions are the same as the assumptions used in the September 30, 2022 funding valuation and are based on the results of an actuarial experience study for the period October 1, 2017 through September 30, 2022.

Determination of discount rate and investment rates of return

The long-term expected rate of return on pension plan investments was determined using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage, adding expected inflation. The target allocation (approved by the Board) and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before investment expenses, used in the derivation of the long-term expected investment rate of return assumption are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return[1]
Domestic equity	45%	6.66%
Developed markets	14%	6.96%
Emerging markets	6%	8.46%
Core Fixed Income	20%	1.36%
High Yield Fixed Income	10%	3.46%
Cash	5%	0.46%
Total	100%	

Discount rate. The blended discount rate used to measure the total pension liability was 4.77% as of September 30, 2022 and 2.52% as of September 30, 2021. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate. Projected employer contributions and annual funding note revenue that are intended to fund the service costs of future plan members and their beneficiaries are excluded, as are projected employee contributions from future plan members. Based on those assumptions, the pension plan's fiduciary net position was not projected to be available to make all projected future benefit payments of current plan members. Therefore, the expected rate of return on pension plan investments of 6.00% was applied to all periods of projected benefit payments that are covered by projected assets. For periods where projected future benefit payments are not covered by assets, the yield on a 20-year AA Municipal Bond Index was applied. As of September 30, 2022, that rate was 4.02% as compared to 2.26% as of the prior year.

[1] Real rates of return are net of inflation.

Discount rate sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability (NPL), calculated using the discount rate of 4.86%, as well as what the NPL would be if it were calculated using a discount rate that is 1-percentage-point lower (3.77%) or 1-percentage-point higher (5.77%) than the current rate.

	1% Decrease (3.77%)	Current Discount Rate (4.77%)	1% Increase (5.77%)
Net Pension Liability	$4,618,086,578	$4,091,073,544	$3,650,096,650

Exhibit 2: Schedule of changes in Net Pension Liability

	2022	2021	2020	2019
Total pension liability				
• Service cost	$119,441,940	$126,707,925	$112,031,977	$76,814,792
• Interest	144,894,105	141,595,763	159,341,425	207,423,206
• Change of benefit terms	0	0	0	0
• Differences between expected and actual experience	-56,164,946	-370,470,229	17,582,658	-2,954,116
• Changes of assumptions	-1,206,473,661	-213,831,991	351,004,813	1,045,622,246
• Benefit payments, including refunds of employee contributions	-281,234,077	-271,876,439	-273,912,786	-275,738,622
Net change in Total Pension Liability	**-$1,279,536,639**	**-$587,874,971**	**$366,048,087**	**$1,051,167,506**
Total Pension Liability – beginning	**5,770,941,174**	**6,358,816,145**	**5,992,768,058**	**4,941,600,552**
Total Pension Liability – ending (a)	**$4,491,404,535**	**$5,770,941,174**	**$6,358,816,145**	**$5,992,768,058**
Plan Fiduciary Net Position				
• Contributions – employer	$105,883,097	$104,844,144	$100,422,478	$106,183,907
• Contributions – employee	54,172,778	50,991,005	50,861,064	49,035,132
• Funding Note	89,198,738	- -	- -	- -
• Net investment income	-35,316,275	20,247,557	38,093,939	40,161,690
• Benefit payments, including refunds of employee contributions	-281,234,077	-271,876,439	-273,912,786	-275,738,622
• Administrative expense	-15,196,848	-14,282,647	-14,688,038	-15,162,645
• Other	7,695,671	2,664,549	3,642,816	4,820,140
Net change in Plan Fiduciary Net Position	**-$74,796,916**	**-$107,411,831**	**-$95,580,527**	**-$90,700,398**
Plan Fiduciary Net Position – beginning	**475,127,907**	**582,539,738**	**678,120,265**	**768,820,663**
Plan Fiduciary Net Position – ending (b)	**$400,330,991**	**$475,127,907**	**$582,539,738**	**$678,120,265**
Net Pension Liability – ending (a) – (b)	**$4,091,073,544**	**$5,295,813,267**	**$5,776,276,407**	**$5,314,647,793**
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	**8.91%**	**8.23%**	**9.16%**	**11.32%**
Covered payroll	**$433,180,978**	**$429,477,835**	**$411,757,386**	**$399,386,941**
Net Pension Liability as percentage of covered payroll	**944.43%**	**1,233.08%**	**1,402.83%**	**1,330.70%**

Section 5: GASB Information

	2018	2017	2016	2015	2014
Total pension liability					
• Service cost	$89,233,179	$101,716,941	$87,734,650	$69,262,969	$65,274,936
• Interest	193,824,703	176,503,962	192,803,756	184,451,782	191,113,749
• Change of benefit terms	0	0	-48,588,579	0	-40,421,809
• Differences between expected and actual experience	2,839,939	25,049,512	76,689,946	98,193,233	35,917,905
• Changes of assumptions	-304,877,189	-361,658,766	431,433,618	731,994,972	241,527,329
• Benefit payments, including refunds of employee contributions	-265,331,162	-259,464,878	-259,011,168	-250,110,255	-247,069,503
Net change in Total Pension Liability	**-$284,310,530**	**-$317,853,229**	**$481,062,223**	**$833,792,701**	**$246,342,607**
Total Pension Liability – beginning	**5,225,911,082**	**5,543,764,311**	**5,062,702,088**	**4,228,909,387**	**3,982,566,780**
Total Pension Liability – ending (a)	**$4,941,600,552**	**$5,225,911,082**	**$5,543,764,311**	**$5,062,702,088**	**$4,228,909,387**
Plan Fiduciary Net Position					
• Contributions – employer	$96,747,868	$84,802,335	$86,346,597	$72,287,934	$68,298,617
• Contributions – employee	44,481,827	47,925,193	41,459,511	36,245,015	34,020,107
• Funding Note	- -	- -	- -	- -	- -
• Net investment income	54,077,199	67,401,362	70,993,934	4,967,602	60,326,921
• Benefit payments, including refunds of employee contributions	-265,331,162	-259,464,878	-259,011,168	-250,110,255	-247,069,503
• Administrative expense	-14,505,786	-14,997,033	-15,267,630	-16,401,722	-18,867,491
• Other	7,880,224	2,641,471	1,599,548	1,161,301	3,573,611
Net change in Plan Fiduciary Net Position	**-$76,649,830**	**-$71,691,550**	**-$73,879,208**	**-$151,850,124**	**-$99,717,738**
Plan Fiduciary Net Position – beginning	**845,470,493**	**917,162,043**	**991,041,251**	**1,142,891,375**	**1,242,609,113**
Plan Fiduciary Net Position – ending (b)	**$768,820,663**	**$845,470,493**	**$917,162,043**	**$991,041,251**	**$1,142,891,375**
Net Pension Liability – ending (a) – (b)	**$4,172,779,889**	**$4,380,440,589**	**$4,626,602,268**	**$4,071,660,837**	**$3,086,018,012**
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	**15.56%**	**16.18%**	**16.54%**	**19.58%**	**27.03%**
Covered payroll	**$404,775,714**	**$393,771,228**	**$368,023,518**	**$355,603,653**	**$370,131,865**
Net Pension Liability as percentage of covered payroll	**1,030.89%**	**1,112.43%**	**1,257.15%**	**1,145.00%**	**833.76%**

Section 5: GASB Information

Notes to Schedule:

Benefit changes:

In the year ended September 30, 2016, there were changes to the eligibility and benefit amounts for Tier 2 Regular and Public Safety Employees for Service and Early pensions reflected in this valuation. The plan of benefits, including those changes, are described in detail in Section 4 of the report.

Change of Assumptions:

In the year ended September 30, 2014, amounts reported as changes in assumptions resulted from a decrease in the discount rate used to measure the total pension liability from 4.87% as of September 30, 2013 to 4.42% as of September 30, 2014.

In the year ended September 30, 2015, amounts reported as changes in assumptions resulted from a decrease in the discount rate used to measure the total pension liability from 4.42% as of September 30, 2014 to 3.84% as of September 30, 2015 and several changes in assumptions based on the actuarial experience study as of September 30, 2015 adopted by the Board effective September 30, 2015. The changes include changes to the long-term expected rate of return, salary scale, inflation, the mortality assumption for healthy and disabled lives including the provision for future mortality improvement, retirement ages for active members and pre-retirement decrement rates for turnover and disability.

In the year ended September 30, 2016, amounts reported as changes in assumptions resulted from a decrease in the discount rate used to measure the total pension liability from 3.84% as of September 30, 2015 to 3.20% as of September 30, 2016.

In the year ended September 30, 2017, amounts reported as changes in assumptions resulted from an increase in the discount rate and to measure the total pension liability from 3.20% as of September 30, 2016 to 3.74% as of September 30, 2017.

In the year ended September 30, 2018, amounts reported as changes in assumptions resulted from an increase in the discount rate and to measure the total pension liability from 3.74% as of September 30, 2017 to 4.25% as of September 30, 2018.

In the year ended September 30, 2019, amounts reported as changes in assumptions resulted from a decrease in the discount rate and to measure the total pension liability from 4.25% as of September 30, 2018 to 2.67% as of September 30, 2019. The expected rate of return for funding valuation was changed from 7.00% to 4.00%.

In the year ended September 30, 2020, amounts reported as changes in assumptions resulted from a decrease in the discount rate and to measure the total pension liability from 2.67% as of September 30, 2019 to 2.23% as of September 30, 2020.

In the year ended September 30, 2021, amounts reported as changes in assumptions resulted from an increase in the discount rate and to measure the total pension liability from 2.23% as of September 30, 2020 to 2.52% as of September 30, 2021.

Section 5: GASB Information

In the year ended September 30, 2022, amounts reported as changes in assumptions resulted from an increase in the discount rate used to measure the total pension liability from 2.52% as of September 30, 2021 to 4.77% as of September 30, 2022 and several changes in assumptions based on the actuarial experience study as of September 30, 2022. The changes include changes to the long-term expected rate of return, salary scale, inflation, administrative expenses, the mortality assumption for healthy and disabled lives including the provision for future mortality improvement, retirement rates for active members and pre-retirement decrement rates for turnover.

Exhibit 3: Schedule of employer contributions

Year Ended September 30	Actuarially Determined Employer Contributions (ADEC)	Contributions in Relation to the ADEC[2]	Contribution Deficiency (Excess)	Covered-Employee Payroll	Contributions as a Percentage of Covered Payroll
2013[1]	$172,439,842	$64,431,322	$108,008,520	$381,012,309	16.91%
2014	189,715,251	68,298,617	121,416,634	370,131,865	18.45%
2015	200,089,791	72,287,934	127,801,857	355,603,653	20.33%
2016	247,158,137	86,346,838	160,811,299	368,023,518	23.46%
2017	250,574,023	84,802,335	165,771,688	393,771,228	21.54%
2018	267,743,116	96,747,868	170,995,248	401,071,344	24.12%
2019	277,523,563	106,183,907	171,339,656	404,775,714	26.23%
2020	365,803,372	100,422,478	265,380,894	399,386,941	25.14%
2021	373,748,689	104,844,144	268,904,545	411,757,386	25.46%
2022	361,771,924	195,081,835	255,888,827	429,477,835	24.65%

Notes to Schedule:
Method, assumptions and models used:

Valuation date	Actuarially determined contribution is calculated as of September 30
Actuarial cost method	Entry age Normal Cost Method determined as a level percent of salary
Amortization method	Level dollar
Amortization period	20 years open amortization
Asset valuation method	Market Value
Model	The blended discount rate used for calculating total pension liability is based on a model developed by our Actuarial Technology and Systems unit, comprised of both actuaries and programmers. The model allows the client team, under the supervision of the responsible actuary, control over the entry of future expected contribution income, benefit payments and administrative expenses. The projection of fiduciary net position and the discounting of benefits is part of the model.

[1] Estimated based on prior year's actuarial valuation.
[2] Includes payments made from the GERS Funding Note.

Appendix A: Definition of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Actuarial accrued liability for actives	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial accrued liability for retirees and beneficiaries	Actuarial Present Value of lifetime benefits to existing retirees and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial cost method	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial gain or loss	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield actuarial liabilities that are larger than projected.
Actuarially equivalent	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
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. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Appendix A: Definition of Pension Terms

Actuarial present value of future benefits	The Actuarial Present Value of benefit amounts 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, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund of member contributions or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
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 plan, as well as Actuarially Determined Contributions.
Actuarial value of assets	The value of the Plan's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the Actuarially Determined Contribution.
Actuarially determined	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the Plan.
Actuarially determined contribution	The employer's contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization method	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the Unfunded Actuarial Accrued Liability. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the Unfunded Actuarial Accrued Liability. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization payment	The portion of the pension plan contribution, or ADC, that is intended to pay off the Unfunded Actuarial Accrued Liability.

Appendix A: Definition of Pension Terms

Assumptions or actuarial assumptions	The estimates upon which the cost of the Plan is calculated, including: Investment return - the rate of investment yield that the Plan will earn over the long-term future; Mortality rates - the rate or probability of death at a given age for employees and retirees; Retirement rates - the rate or probability of retirement at a given age or service; Disability rates - the rate or probability of disability retirement at a given age; Withdrawal rates - the rate or probability at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; Salary increase rates - the rates of salary increase due to inflation, real wage growth and merit and promotion increases.
Closed amortization period	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 20 years, it is 19 years at the end of one year, 18 years at the end of two years, etc. See Open Amortization Period.
Decrements	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined benefit plan	A retirement plan in which benefits are defined by a formula based on the member's compensation, age and/or years of service.
Defined contribution plan	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer normal cost	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience study	A periodic review and analysis of the actual experience of the Plan that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified based on recommendations from the Actuary.
Funded ratio	The ratio of the Actuarial Value of Assets (AVA) to the Actuarial Accrued Liability (AAL). Plans sometimes also calculate a market funded ratio, using the Market Value of Assets (MVA), rather than the AVA.
GASB 67 and GASB 68	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.

Appendix A: Definition of Pension Terms

Investment return	The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL)	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal cost	The portion of the Actuarial Present Value of Future Benefits and expenses, if applicable, allocated to a valuation year by the Actuarial Cost Method. Any payment with respect to an Unfunded Actuarial Accrued Liability is not part of the Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of member contributions and employer Normal Cost unless otherwise specifically stated.
Open amortization period	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in each future year in determining the Amortization Period.
Plan Fiduciary Net Position	Market value of assets.
Service costs	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Total Pension Liability (TPL)	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded actuarial accrued liability	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus or an Overfunded Actuarial Accrued Liability.
Valuation date or actuarial valuation date	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

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