BUCK
A Gallagher Company

Retirement Plan for Chicago Transit Authority Employees

Actuarial Valuation Report as of January 1, 2023, including supplementary disclosure information for GASB Statement Nos. 67 and 68

September 2023

100 Galleria Parkway, SE
Suite 1060
Atlanta, GA 30339

September 11, 2023

Board of Trustees and Executive Director
Retirement Plan for Chicago Transit Authority Employees
55 West Monroe St., Suite 1950
Chicago, IL 60603

Ladies and Gentlemen:

This report presents the results of the annual valuation of the assets and liabilities of The Retirement Plan for Chicago Transit Authority Employees (Plan) as of January 1, 2023, prepared in accordance with 40 ILCS 5/22-101(e). In addition, it includes disclosure information as of December 31, 2022, required under Governmental Accounting Standards Board Statement Nos. 67 and 68. The actuarial valuation of the Plan is performed annually and Buck Global, LLC (Buck) was retained to perform the valuation as of January 1, 2023. This valuation has been conducted in accordance with all applicable Actuarial Standards of Practice issued by the Actuarial Standards Board.

The actuarial valuation is based on unaudited financial and member data provided by the staff of the Plan and summarized in this report. The benefits considered are those delineated in the Plan and are governed by legislation contained in the Illinois Compiled statutes, particularly Chapter 40, as amended and restated effective December 31, 2012. The actuary did not verify the data submitted but did perform tests for consistency and reasonableness. The accuracy of the results contained in this report is dependent upon the accuracy of the data.

Contribution rates were determined in accordance with 40 ILCS 5/22-101(e) using the projected unit credit cost method and, under the actuarial assumptions used in the valuation, are expected to produce a funded ratio of at least 60 percent no later than ten years after the valuation year through fiscal year end 2039. Contribution rates reflect the issuance of bond or notes by the Chicago Transit Authority (Authority), as defined in 70 ILCS 3605/12c. Authority contribution rates are adjusted by a debt service credit, for debt service paid in the prior year, of up to six percent of compensation per year from 2009 to 2040, as defined in 40 ILCS 5/22-101(e)(2).

Results of this valuation deviated from those that would have been projected based on the results of the January 1, 2022 actuarial valuation for a number of reasons including market returns of -8.88% compared to the 8.25% assumed rate of return, demographic experience, updated participant data, and salary increases that were greater than expected. Overall, these events caused the funded ratio to not meet the standards set forth in ILCS 5/22-101(e) and, therefore, there is a need to increase authority and employee contribution rates to comply with 40 ILCS 5/22-101(e). The rates will increase as follows:

Annual Contributions to the Plan (Percentage of Compensation)		
Fiscal Year	Authority	Employees
2024 to 2040	21.590%	13.795%

Based on these rates, the sum of current assets, net bond proceeds, future contributions and investment earnings, less benefit payments and expenses, assets held by the Plan are projected to be equal to at least 60 percent of actuarial liabilities by 2033 and through fiscal year end 2040, if these contributions, expressed as a percentage of compensation, are made to the Plan and the Plan experiences no net actuarial losses in the future.

40 ILCS 5/22-101(e)(4) provides for a minimum contribution, determined either by the Board of Trustees or the Auditor General, to bring the funded ratio of the Plan “up to” or “to no less than” 90% by December 31, 2059.

While not required by 40 ILCS 5/22-101(e)(3), for informational purposes, Buck has provided a contribution amount equal to the Actuarial Math Contribution:

- Fund 100% of the entry age normal cost method
- Fund the expected administrative expenses for the fiscal year
- Pay off the unfunded liability over 20 years and as a level percentage of payroll

Under this method, a contribution of approximately 33.51% of payroll (total contribution) is appropriate.

The results documented in this report are estimated based on data that may be imperfect and on assumptions about future events. Assumptions may have been made about participant data or other factors. Reasonable efforts were made in this valuation to ensure that items that were significant in the context of the actuarial liabilities or costs are treated appropriately and not excluded or included inappropriately. We believe that the use of approximation in our calculations, if any, has not resulted in a significant difference relative to the results we would have obtained using more detailed calculations.

A range of results, different from those presented in this report could be considered reasonable. The numbers are not rounded, but this is for convenience only and should not imply precision, which is not inherent in actuarial calculations.

Experience studies are performed once in every five-year period. This valuation was prepared on the basis of the demographic and economic assumptions that were recommended on the basis of an Experience Review covering the period from January 1, 2013 through December 31, 2017 and adopted by the Board of Trustees at their April 2019 meeting, which include an 8.25% per annum rate of investment return. These assumptions will remain in effect for valuation purposes until such time as the Board of Trustees adopts revised assumptions.

We believe that the economic and demographic assumptions adopted in accordance with the recent experience study are reasonable and appropriate for the purposes of this valuation. The assumptions and methods used for financial reporting and all supporting schedules fulfill the requirements of GASB Statement Nos. 67 and 68.

Historical valuation results presented in this report represent results taken from prior actuarial reports, and results shown for some years may reflect funding methods and techniques used by the prior actuary. Our report/certification does not apply to those results, other than to represent that our report has presented accurate information developed by prior actuaries.

Where presented, the “funded ratio”, “funded status” and “unfunded accrued liability” typically are measured using the actuarial value of assets. It should be noted that use of the market value of assets would result in different values of the funded ratio, funded status, and unfunded accrued liability. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but not for assessment of the funded status of the Plan if it were to settle (i.e., purchase annuities to cover) a portion or all of its liabilities.

Where presented, the “net pension liability” is measured on a market value of assets basis. This item presented may not be appropriate for evaluating the need and level of future contributions and make no assessment regarding the cost to settle (i.e., purchase annuities to cover) any portion of the Plan’s liabilities.

Future actuarial measurements may differ significantly from the current measurement presented in this report due to such factors as: plan experience different from that anticipated by the economic and 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. An analysis of the potential range of such future measurements is beyond the scope of this report, but a description of future risks to the plan is provided in Section 7.

Use of this report for any other purpose, or by anyone other than the Board of Trustees or the Plan’s staff or its auditors, may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. Buck should be asked to review any statement to be made on the basis of the results contained in this report. Buck will accept no liability for any such statement made without prior review by Buck.

Actuarial Standards of Practice Nos. 27 and 35 require the actuary to identify the economic and demographic assumptions that have a significant effect on the measurement and, for those that are prescribed by another party, to provide the information and analysis the actuary performed to determine that the assumption does not significantly differ from what the actuary deems reasonable for the purpose of the measurement. The mortality assumption used in this valuation reflects the Society of Actuaries’ most recently published tables of public sector pension plan rates. In the case of the sponsor’s selection of expected return on assets (“EROA”), the signing actuary used economic information provided by Buck’s Financial Risk Management (“FRM”) practice. A spreadsheet tool created by the FRM team converts averages, standard deviations, and correlations from Buck’s Capital Markets Assumptions (“CMA”) that are used for stochastic forecasting into approximate percentile ranges for the arithmetic and geometric average returns. Percentiles are based on standard matrix multiplication and normal approximations. This simplified model (disclosed here under ASOP 56) ignores inter-period dependence and the skewed nature of single year returns. As such it is intended to suggest possible reasonable ranges for EROA without attempting to predict or select a specific best estimate rate of return. However, it does take into account the duration (horizon) of investment and the approximate allocation of assets in the portfolio to various asset classes with different expected returns, standard deviations, and correlations to other asset classes. Under current calibrations, the EROA tool will tend to show higher expected returns for longer durations, and will show a greater divergence between arithmetic and geometric average returns the higher the standard deviation of portfolio return. Based on the actuary's analysis, including consistency with other assumptions used in the valuation, and the percentiles generated by the spreadsheet described above, the actuary believes the EROA is reasonable for the purpose of the measurement.

Actuarial Standard of Practice No. 56 provides guidance to actuaries when performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating models. Buck uses third-party software in the performance of annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the provisions of the plan using data and assumptions as of the measurement date under the funding methods specified in this report. The output from the third-party software is used as input for an internally developed model that applies the applicable funding methods to the liabilities derived and other inputs, such as plan assets and contributions, to generate many of the exhibits found in this report. Buck has an extensive review process whereby the results of the liability calculations are checked using detailed sample output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other funding outputs are similarly reviewed in detail and at a high level for accuracy, reasonability, and consistency with prior results. Buck also reviews the model when significant changes are made to the third-party software. The review is performed by experts within the company who are familiar with applicable funding methods as well as the manner in which the model generates its output. Significant changes to the internal model that are applicable to multiple clients are generally developed, checked, and reviewed by multiple experts within the company who are familiar with the details of the required changes.

In our opinion the calculations also comply with Illinois law and, where applicable, the Statements of the Governmental Accounting Standards Board. We certify that the information presented herein is accurate and fairly portrays the actuarial position of the Plan as of January 1, 2023.

We completed the valuation in accordance with accepted actuarial procedures as prescribed by the Actuarial Standards Board. We are members of the American Academy of Actuaries and are experienced in performing actuarial valuations of public employee retirement systems. To the best of our knowledge, this report is complete and accurate and has been prepared in accordance with generally accepted actuarial principles and practice. We meet the qualification standards to render the actuarial opinions contained in this report and are available to answer questions about them.

Respectfully submitted,

Buck Global, LLC

David L. Driscoll

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Executive Summary

Membership

Actives: As of January 1, 2023, there were 7,409 members in active service covered under the provisions of the Plan. The significant age, service, salary, and accumulated contribution information for these members is summarized below, along with corresponding figures from the last actuarial valuation one year earlier.

	January 1, 2023	January 1, 2022
Number of active employees [1]	7,409	7,725
Average age	48.7	48.7
Average years of service	12.4	12.7
Total annual valuation salary [2]	$659,594,235	$657,399,211
Average annual salary [2]	$90,158	$86,070
Total accumulated contributions	$695,075,467	$680,411,548
Average accumulated contributions [2]	$95,008	$89,082

1 Active statistics include all participants who are actively employed, which includes 10 participants this year and 16 participants last year who are on leave and 93 participants this year and 87 particpants last year who have opted out of participating in the Plan and are only entitled to a return of their contributions.

2 The salary information for the 93 participants this year & 87 particpants last year who have opted out of participating in the Plan is not included.

The number of active members decreased by 4.1% from the previous valuation date. The average age of the active members remained the same. The average service decreased by 2.4%. The total annual valuation salary increased by 0.3%. The average salary increased by 4.7% from the previous valuation.

Distributions of active members by age and service are given in Section 5.2.

Terminated Vested: In addition to the active members, there were 150 terminated vested members who did not elect to receive their accumulated contributions when they left covered employment. The significant age and annual benefit information for these terminated vested members is summarized below with comparative figures from the last actuarial valuation one year earlier.

	January 1, 2023	January 1, 2022
Number of deferred vested members [3]	150	146
Average age	57.1	57.5
Average annual benefit	$27,147	$26,919

3 Number of deferred vested members includes 8 in 2023 and 6 in 2022 who were pending cashouts after the valuation date. These members are not included in the calculation of the average benefit.

The number of terminated vested members increased by 2.7% from the previous valuation. The average age of the terminated vested members decreased by 0.4 years. The average annual pension benefit for these members increased by 0.8% from the previous valuation.

Distributions of terminated vested members by age and pension benefit are given in Section 5.4.

Retirees and Beneficiaries: In addition to the active and terminated vested members, there were 8,128 retired members, 1,365 members with disability allowances and 1,248 beneficiaries who were receiving monthly benefit payments on the valuation date. The significant age and annual benefit information for these members are summarized below with comparative figures from the last actuarial valuation performed one year earlier.

	January 1, 2023	January 1, 2022
Number of members receiving payments		
➢ Retirees	8,128	8,054
➢ Disability Allowances	1,365	1,351
➢ Beneficiaries	1,248	1,228
➢ Total	10,741	10,633
Average age	71.7	71.6
Annual benefit amounts		
➢ Retirees	$270,886,636	$259,411,251
➢ Disability Allowances	$27,362,523	$26,185,765
➢ Beneficiaries	$17,065,298	$16,120,744
➢ Total	$315,314,457	$301,717,760
Average annual benefit payments	$29,356	$28,376

The number of members receiving payments increased by 1.0% from the previous valuation date. The average age of these members increased by 0.1 years. The total annual benefit payments for these members increased by 4.5% from the previous valuation date.

Distributions of retired members by age and benefit amounts are given in Section 5.3.

Plan Assets

The Plan's assets are held in trust and invested for the exclusive benefit of Plan members. The trust is funded by member and employer contributions and pays benefits directly to eligible members in accordance with Plan provisions. The assets are audited annually and are reported at fair value. On a fair value basis, the Plan has Net Assets Available for Benefits of $1,901.9 million as of January 1, 2023. This includes a decrease of $286.6 million over the Net Assets Available for Benefits of $2,188.5 million as of January 1, 2022. During the prior year, the investment return was -8.88% as reported by the Plan.

Starting with the January 1, 2017 valuation, the Board of Trustees adopted an actuarial value of assets to be used for funding purposes. This method recognizes differences of asset returns from their expected levels over a period of five years. The actuarial value of assets is $2,076.0 million as of January 1, 2023. This includes an increase of $18.9 million over the actuarial value of assets of $2,057.1 million as of January 1, 2022. During the prior year, the investment return on the actuarial value assets was 5.75%.

A summary of the assets held for investment, a summary of changes in assets, and the development of the actuarial value of assets is shown in Section 2.

Actuarial Experience

Differences between the expected experience based on the actuarial assumptions and the actual experience create changes in the actuarial accrued liability, actuarial value of assets, and the unfunded actuarial accrued liability from one year to the next. These changes create an actuarial gain if the experience is favorable and an actuarial loss if the experience is unfavorable. The Plan experienced a total net actuarial loss of $99.8 million during the prior year. This net loss is approximately 2.67% of the Plan's prior year actuarial accrued liability. The net loss is a combination of two principal factors, demographic experience, and investment performance.

The demographic experience tracks actual changes in the Plan's population compared to the assumptions for decrements such as mortality, turnover, and retirement, as well as pay increases. The Plan experienced a demographic loss of $49.5 million during the year ending December 31, 2022. This loss increased the unfunded actuarial accrued liability by $49.5 million and decreased the funded ratio by 0.71%.

Continued tracking of the demographic experience is warranted in order to confirm the appropriateness of the actuarial assumptions. Details of the demographic, economic, and other assumptions used to value the Plan liabilities and normal cost can be found in Section 6.

On the asset side, the Plan experienced a loss on a fair value of assets basis. The actual rate of return on the fair value of plan assets was -8.88% for the year ending December 31, 2022 compared to the assumption of 8.25%.

The rate of return on the actuarial value of plan assets for the year ending December 31, 2022 was approximately 5.75% compared to the assumption of 8.25%. The loss on the actuarial value of assets increased the unfunded actuarial accrued liability by $50.3 million and decreased the funded ratio by 1.31%. It should be noted that the Plan's assumed asset return of 8.25% is a long-term rate and short-term performance is not necessarily indicative of expected long-term future returns.

In our opinion, the economic assumptions comply with Actuarial Standards of Practice No. 27 and the demographic assumptions comply with Actuarial Standards of Practice No. 35.

A summary of the actuarial gains and losses experienced during the prior year is shown in Section 1.4.

Funded Status

The funded status is a measure of the progress that has been made in funding the Plan as of the valuation date. It is determined as a ratio of the actuarial value of assets divided by the total actuarial accrued liability on the valuation date. The funded ratio presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the Plan if the Plan were to settle (i.e., purchase annuities) a portion or all of its liabilities.

As of January 1, 2023, the funded ratio of the Plan is 54.20%. This represents a decrease of 0.79% from the Plan's funded ratio of 54.99% as of January 1, 2022. Unless otherwise noted, the funded status shown in the report is based on the projected unit credit cost method.

A history of the plan's unfunded actuarial accrued liability and funded ratio is shown in Section 1.5
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Statutory Contributions

Actual required contribution rates were determined in accordance with 40 ILCS 5/22-101(e) using the projected unit credit cost method and calculated to produce an expected funded ratio of at least 60 percent no later than ten years after the valuation year through fiscal year end 2039 and 90 percent funding by fiscal year end 2059. Contribution rates reflect the issuance of bond or notes by the Authority, as defined in 70 ILCS 3605/12c. Authority contribution rates are adjusted by a debt service credit, for debt service paid in the prior year, of up to six percent of compensation per year from 2009 to 2040, as defined in 40 ILCS 5/22-101(e)(2).

Actuarial Math Contributions

While not required by 40 ILCS 5/22-101(e), white papers on funding policies for public sector plans developed over the past few years suggest a funding policy be sufficient to pay the normal cost on the entry age normal cost basis and amortize the unfunded actuarial accrued liability over a fixed period of 20 years. We will broadly refer to this type of policy as an Actuarial Math Funding Policy. For informational purposes, Buck has provided a contribution amount based on the Actuarial Math Funding Policy.

Under Actuarial Math, the normal cost represents the cost of the benefits that accrue during the year for active members under the Entry Age Normal Cost Method, plus a load for the expected administrative expenses to be paid during the fiscal year. The Entry Age Normal Cost is determined as a level percent of pay over each individual career attributable to the respective plan year. The normal cost for 2023 has been determined to be $56.3 million, or 8.53% of pay. This represents an increase in the normal cost rate of 0.15% of pay from last year’s normal cost rate of 8.38%.

Under Actuarial Math, the cost method under which the actuarial accrued liability is determined is the entry age normal cost method. Under the entry age normal cost method, the actuarial accrued liability (AAL) is equal to the present value of projected benefits less the present value of future benefits to be accrued. The AAL amount is compared to the actuarial value of assets to determine if the Plan is ahead or behind in funding as of the valuation date. The difference between the total actuarial accrued liability and the actuarial value of assets equals the amount of unfunded actuarial accrued liability (UAAL) or surplus (if negative) on the valuation date. This amount is amortized over 20 years as a level percent of pay and added to the normal cost to determine the annual required contribution for the year suggested by public sector funding policy white papers.

The UAAL under the entry age normal cost method as of January 1, 2023 is $1,881.3 million. This represents an increase of $67.3 million in the unfunded actuarial accrued liability from last year’s amount of $1,814.0 million. The annual payment required to amortize the unfunded actuarial accrued liability of $1,881.3 million as of January 1, 2023 is $156.2 million, or 23.67% of pay.

The total contribution suggested by actuarial math is the sum of the normal cost and the payment to the UAAL plus interest, or 33.51% of pay (8.53% of pay attributable to the normal cost plus 23.67% of pay attributable to the amortization of the unfunded plus 1.30% of pay for the mid-year interest adjustment).

The actuarial liabilities and development of the Actuarial Math Contribution is shown in the Comparative Summary and Section 1.1.

In our opinion, the measurement of the benefit obligations and determination of the actuarial cost of the Plan is performed in compliance with Actuarial Standards of Practice No. 4.

Accounting Information

The Governmental Accounting Standards Board (GASB) issues statements which establish financial reporting standards for defined benefit pension plans and accounting for the pension expenditures and expenses for governmental employers. The required financial reporting information for the Plan and the Employer under GASB Statement Nos. 67 and 68 can be found in Section 3.

Projections

As part of the annual actuarial valuation, a forecast of expected future valuation results is performed over a 30-year period beginning on the valuation date. This analysis provides a dynamic look into the future to identify trends in future employer contributions and funded status. The forecast replaces active members who are assumed to decrement (terminate, retire, etc.) during the period with new members resulting in a stable active membership. The forecast assumes all actuarial assumptions are exactly realized each year during the forecast period. The results of these forecasts can be found in Section 4.

Changes in Plan Provisions

There have been no changes in the Plan provisions since the last actuarial valuation performed as of January 1, 2022. A summary of Plan and contribution provisions are outlined in Section 6.1.

Changes in Actuarial Assumptions, Methods, or Procedures

There have been no changes in the actuarial assumptions, methods, and procedures from those used in the prior valuation.

The actuarial assumptions, methods and procedures are outlined in Section 6.2 and Section 6.3.

Comparative Summary of Key Actuarial Valuation Results

	January 1, 2023	January 1, 2022
1. Investment Return Assumption	8.25 %	8.25 %
2. Membership Data		
a. Active Employees		
Number	7,409	7,725
Annualized Salaries (in thousands)	659,594	657,399
Average Pay	90,158	86,070
b. Terminated Participants with Vested Benefits		
Number	150	146
Total Monthly Accrued Benefit	321,241	314,056
Average Monthly Accrued Benefit	2,262	2,243
c. Retirees and Beneficiaries		
Number	9,376	9,282
Total Monthly Pension	23,995,995	22,961,000
Average Monthly Pension	2,559	2,474
d. Disability Allowances		
Number	1,365	1,351
Total Monthly Pension	2,280,210	2,182,147
Average Monthly Pension	1,670	1,615
3. Statutory Minimum Contribution Rates (as a percentage of Payroll)*		
a. Employer Contribution Rate		
Gross Employer Rate	27.590 %	26.647 %
Credit for Debt Repayment	6.000 %	6.000 %
Net Employer Rate	21.590 %	20.647 %
b. Employee Contribution Rate	13.795 %	13.324 %
4. Actuarial Math Contribution		
a. Amortization Payment for UAAL		
i. Amount	156,152,848	150,564,951
ii. As a % of pay	23.67 %	22.90 %
b. Normal Cost		
i. Entry age normal cost amount	53,770,406	52,757,421
ii. Administrative expenses	2,500,000	2,300,000
iii. Normal cost	56,270,406	55,057,421
iv. As a % of pay	8.53 %	8.38 %
c. Interest Adjustment to Mid-Year		
i. Amount	8,588,825	8,313,848
ii. As a % of pay	1.30 %	1.26 %
d. Actuarial Contribution		
i. Amount	221,012,079	213,936,220
ii. As a % of pay	33.51 %	32.54 %
5. Actuarial Funded Status ($ in thousands)		
a. Actuarial Accrued Liability	3,830,189	3,740,656
b. Actuarial Value of Assets (AVA)	2,075,985	2,057,053
c. Unfunded Accrued Liability	1,754,204	1,683,603
d. Funded Ratio	54.2 %	55.0 %
e. Market Value of Assets (MVA)	1,901,932	2,188,484
f. Return on MVA (prior year)	(8.9) %	17.6 %
g. Return on AVA (prior year)	5.8 %	9.8 %

* Contribution rate applicable for the plan year following the year of valuation.

Section 1 - Actuarial Funding Results

Section 1.1
Actuarial Liabilities and Normal Cost

Actuarial Accrued Liability	January 1, 2023	January 1, 2022
1. Active Members		
a. Retirement Benefits	991,171,978	1,017,280,305
b. Withdrawal Benefits	38,217,744	36,484,985
c. Disability Benefits	93,253,412	93,795,724
d. Death Benefits	12,699,996	12,080,519
Total	1,135,343,130	1,159,641,533
2. Inactive Members with Deferred Benefits	24,319,618	23,881,923
3. Retired Members and Beneficiaries Receiving Benefits	2,670,526,351	2,557,132,992
4. Total Actuarial Accrued Liability (1. + 2. + 3.)	**3,830,189,099**	**3,740,656,448**

Normal Cost	January 1, 2023	January 1, 2022
1. Active Members		
a. Retirement Benefits	54,415,765	54,543,767
b. Withdrawal Benefits	5,815,916	4,994,040
c. Disability Benefits	7,594,640	7,312,189
d. Death Benefits	1,065,492	934,346
2. Normal Cost	**68,891,813**	**67,784,342**
3. Total Normal Cost (As a % of pay)	**10.44%**	**10.31%**

Section 1.2
Actuarial (Gain) / Loss

Development of Actuarial (Gain) / Loss	Amount
1. Expected Actuarial Accrued Liability	
a. Actuarial Accrued Liability at January 1, 2022	3,740,656,448
b. Normal Cost at January 1, 2022	67,784,342
c. Interest on a. + b. to End of Year	314,196,365
d. Benefit Payments for 2022, with Interest to End of Year	341,957,278
e. Expected Actuarial Accrued Liability Before Changes (a. + b. + c. - d.)	3,780,679,877
2. Actuarial Accrued Liability at January 1, 2023	3,830,189,099
3. Liability (Gain) / Loss (2. – 1.g.)	49,509,222
4. Expected Actuarial Value of Assets	
a. Actuarial Value of Assets at January 1, 2022	2,057,052,824
b. Interest on a. to End of Year	169,706,859
c. Contributions Made for 2022	234,610,329
d. Interest on c. to End of Year	9,485,906
e. Benefit Payments and Administrative Expenses for 2022, with Interest to End of Year	344,546,233
f. Expected Actuarial Value of Assets at January 1, 2023	
(a. + b. + c. + d. – e.)	2,126,309,685
5. Actuarial Value of Assets as of January 1, 2023	2,075,985,048
6. Actuarial Value Asset (Gain) / Loss (4.f. - 5.)	50,324,637
7. Total Actuarial (Gain) / Loss (3. + 6.)	99,833,859

Section 1.3
Actuarial Balance Sheet

Financial Resources	January 1, 2023	January 1, 2022
1. Actuarial Value of Assets	2,075,985,048	2,057,052,824
2. Present Value of Future Contributions	526,022,512	516,495,378
3. Unfunded Actuarial Accrued Liability/(Reserve)	1,754,204,051	1,683,603,624
4. Total Assets (1 + 2 + 3)	4,356,211,611	4,257,151,826

Benefit Obligations	January 1, 2023	January 1, 2022
1. Present Value of Future Benefits		
a. Active Members	1,661,365,642	1,676,136,911
b. Inactive Members	24,319,618	23,881,923
c. Retirees, disabilities and beneficiaries	2,670,526,351	2,557,132,992
d. Total	4,356,211,611	4,257,151,826

Section 1.4
Analysis of Financial Experience

Analysis of Actuarial (Gains) and Losses Resulting from Differences Between Assumed Experience and Actual Experience

Type of (Gain) or Loss	Year End December 31, 2022	As a % of Last Year's AAL
(1) COLA Experience	0	0.00%
(2) Salary Experience	22,744,832	0.61%
(3) Retiree Mortality Experience	(1,900,862)	-0.05%
(4) Other (turnover, retirement ages, service purchase, etc.)		0.00%
(a) Unexpected Participant Pick Up	1,637,254	0.04%
(b) Unexpected Data Change for Decrementing Actives	5,637,626	0.15%
(c) Unexpected Data Change for Continuing Actives	1,475,413	0.04%
(d) Unexpected Data Change for Continuing Inactives	(243,744)	-0.01%
(e) Unexpected Rehires	(278,607)	-0.01%
(f) Difference between actual and expected benefit payments	(1,986,545)	-0.05%
(g) Miscellaneous	3,965,380	0.11%
(h) Total	10,206,777	0.27%
(5) Active Decrements	14,829,883	0.40%
(6) New Entrants	3,628,592	0.10%
(7) Liability (Gain) or Loss During Year, (1) + (2) + (3) + (4)(h) + (5) + (6)	49,509,222	1.32%
(8) Investment Experience	50,324,637	1.35%
(9) Total (Gain) or Loss During Year before Change, (7) + (8)	99,833,859	2.67%

Section 1.5
History of UAAL and Funded Ratio
($'s in 000's)

Valuation Date	Actuarial Accrued Liability (AAL)	Actuarial Value of Assets (AVA)	Funded Ratio (AVA as a % of AAL)	Unfunded Actuarial Accrued Liability (UAAL)
January 1, 2023	3,830,189	2,075,985	54.20%	1,754,204
January 1, 2022	3,740,656	2,057,053	54.99%	1,683,603
January 1, 2021	3,670,670	1,955,264	53.27%	1,715,406
January 1, 2020	3,583,859	1,883,411	52.55%	1,700,448
January 1, 2019	3,488,955	1,835,792	52.62%	1,653,163
January 1, 2018	3,423,218	1,802,216	52.65%	1,621,002
January 1, 2017	3,338,641	1,752,473	52.49%	1,586,168
January 1, 2016 *	3,267,121	1,743,216	53.36%	1,523,904
January 1, 2015 *	3,186,187	1,855,912	58.25%	1,330,275
January 1, 2014 *	3,105,567	1,892,714	60.95%	1,212,853
January 1, 2013 *	2,867,335	1,702,788	59.39%	1,164,547
January 1, 2012 *	2,808,184	1,662,196	59.19%	1,145,988

* Actuarial Value of Assets is Fair Market Value

Section 1.6
Solvency Test

Comparative Summary of Accrued Liability and Actuarial Value of Assets

	Accrued Liability for:				Portion of Accrued Liability Covered by Actuarial Value of Assets		
Valuation as of January 1	(1) Active Member Contributions	(2) Retirees, Beneficiaries, TVRs and Disabled	(3) Active Member (Employer Financed Portion)	Actuarial Value of Assets[1]	(1)	(2)	(3)
2023	695,075,467	2,694,845,969	440,267,663	2,075,985,048	100.00 %	51.24 %	0.00 %
2022	680,411,548	2,581,014,915	479,229,985	2,057,052,824	100.00 %	53.34 %	0.00 %
2021	634,800,523	2,520,628,472	515,241,175	1,955,264,394	100.00 %	52.39 %	0.00 %
2020	588,433,604	2,442,447,997	552,977,413	1,883,410,704	100.00 %	53.02 %	0.00 %
2019	544,522,986	2,370,131,785	574,300,017	1,835,791,586	100.00 %	54.48 %	0.00 %

1. Excludes health care assets.

Section 1.7
Projected Actuarial Results

Projection of Funded Status based on Board Approved Contribution Rates

	Board Adopted Contribution Rates			Board Adopted Contributions					
Year	Employee Contribution Percent	Employer Contribution Percent	Total Percent	Employee Contribution	Employer Contribution	Total Contribution	Actuarial Accrued Liability	Actuarial Value of Assets	Funded Ratio
2023	13.324%	20.647%	33.971%	87,882,606	136,189,558	224,072,164	3,830,189,099	2,075,985,048	54.20%
2024	13.795%	21.590%	35.385%	92,040,032	144,048,597	236,088,629	3,876,009,286	2,099,845,450	54.18%
2025	13.795%	21.590%	35.385%	93,267,431	145,969,557	239,236,988	3,921,354,977	2,108,129,275	53.76%
2026	13.795%	21.590%	35.385%	94,716,767	148,237,860	242,954,627	3,962,246,140	2,121,088,022	53.53%
2027	13.795%	21.590%	35.385%	96,666,214	151,288,871	247,955,085	3,998,155,741	2,097,936,583	52.47%
2028	13.795%	21.590%	35.385%	99,004,177	154,947,934	253,952,111	4,029,131,318	2,149,001,299	53.34%
2029	13.795%	21.590%	35.385%	101,481,669	158,825,369	260,307,038	4,055,339,447	2,202,833,671	54.32%
2030	13.795%	21.590%	35.385%	104,057,213	162,856,261	266,913,474	4,077,320,289	2,260,837,967	55.45%
2031	13.795%	21.590%	35.385%	106,872,550	167,262,446	274,134,996	4,095,905,985	2,324,253,202	56.75%
2032	13.795%	21.590%	35.385%	109,870,228	171,954,006	281,824,234	4,111,736,152	2,395,040,481	58.25%
2033	13.795%	21.590%	35.385%	112,842,089	176,605,161	289,447,250	4,126,263,046	2,475,757,833	**60.00%**
2034	13.795%	21.590%	35.385%	116,099,550	181,703,298	297,802,848	4,140,381,037	2,567,910,695	62.02%
2035	13.795%	21.590%	35.385%	119,615,145	187,205,430	306,820,575	4,155,118,470	2,674,171,713	64.36%
2036	13.795%	21.590%	35.385%	123,396,489	193,123,478	316,519,967	4,172,376,620	2,797,676,082	67.05%
2037	13.795%	21.590%	35.385%	127,381,323	199,360,001	326,741,324	4,194,348,660	2,941,958,492	70.14%
2038	13.795%	21.590%	35.385%	131,490,787	205,791,578	337,282,365	4,223,022,861	3,110,355,650	73.65%
2039	13.795%	21.590%	35.385%	135,704,873	212,386,895	348,091,768	4,260,110,656	3,305,827,043	77.60%
2040	13.795%	21.590%	35.385%	140,068,682	219,216,538	359,285,220	4,307,342,867	3,531,513,402	81.99%
2041	13.795%	27.590%	41.385%	144,555,508	289,111,016	433,666,524	4,365,830,518	3,790,409,534	86.82%
2042	13.795%	27.590%	41.385%	149,089,206	298,178,412	447,267,618	4,436,427,698	4,150,616,904	93.56%
2043	13.795%	27.590%	41.385%	153,696,545	307,393,089	461,089,634	4,519,067,505	4,556,413,546	100.83%

Section 2 - Plan Assets

Section 2.1
Statement of Net Plan Assets
($'s in 000's)

	As of December 31	
	2022	**2021**
ASSETS		
1. Total investments, at fair value	1,888,704	2,171,036
2. Invested securities lending cash collateral	60,542	71,002
3. Receivables:		
a. Employer contributions	11,001	13,926
b. Employee contributions	7,131	8,612
c. Securities sold, but not received	6,000	8,140
d. Accrued interest and dividends	1,403	1,684
e. Other	1,252	1,745
4. Total assets	1,976,033	2,276,145
LIABILITIES		
1. Payable upon return of securities	60,542	71,002
2. Accounts payable	2,307	2,651
3. Other payables	76	96
4. Securities purchased, but not paid	11,176	13,912
5. Total liabilities	74,101	87,661
Net assets held in trust for Plan benefits	**1,901,932**	**2,188,484**

Section 2.2
Changes in Net Plan Assets
($'s in 000's)

	As of December 31	
	2022	2021
ADDITIONS		
1. Net investment (loss) income	$ (190,005)	$ 333,302
2. Employer contributions	142,476	136,908
3. Employee contributions	92,134	87,897
4. Other income	-	-
Total additions	$ 44,605	$ 558,107
DEDUCTIONS		
1. Benefit payments	$ 310,458	$ 299,596
2. Contribution refunds, including interest	18,211	8,865
3. Administrative expenses	2,488	2,328
Total liabilities	$ 331,157	$ 310,789
NET ASSETS HELD IN TRUST FOR PLAN BENEFITS		
1. Beginning of year	$ 2,188,484	$ 1,941,166
2. Net (decrease) increase	(286,552)	247,318
End of year	**$ 1,901,932**	**$ 2,188,484**

Section 2.3
Actuarial Value of Assets

Development of Actuarial Value of Assets	8.25%		Amount
1. Actuarial Value of Assets as of January 1, 2022		$	2,057,052,824
2. Unrecognized Return as of January 1, 2022			131,430,951
3. Fair Value of Assets as of January 1, 2022		$	2,188,483,775
4. Contributions			
a. Member (includes purchased service)		$	92,134,551
b. Employer			142,475,778
c. Miscellaneous contributions			-
d. Total		$	234,610,329
5. Distributions			
a. Benefit payments		$	310,458,090
b. Refund of contributions			18,210,270
c. Administrative expenses			2,488,345
d. Total		$	331,156,705
6. Expected Return at 8.25% on			
a. Item 1.		$	169,706,858
b. Item 2.			10,843,053
c. Item 4.d.			9,485,906
d. Item 5.d.			13,389,527
e. Total [a. + b. + c. – d.]		$	176,646,290
7. Actual Return on Fair Value for Fiscal Year, Net of Investment Expenses		$	(190,004,983)
8. Return to be Spread for Fiscal Year (7. – 6.e) *		$	(366,651,273)
9. Total Fair Value of Assets as of January 1, 2023		$	1,901,932,416
10. Return to be Spread			

Fiscal Year	Return to be Spread	Unrecognized Percent	Unrecognized Return
2022	$ (366,651,273)	80%	$ (293,321,018)
2021	176,631,964	60%	105,979,179
2020	(29,402,641)	40%	(11,761,056)
2019	125,251,315	20%	25,050,263
2018	(211,667,812)	0%	-
		Total	$ (174,052,632)

11. Actuarial Value of Assets as of January 1, 2023 (9. – 10.)	**$**	**2,075,985,048**
12. Recognized Rate of Return for the Year on Actuarial Value of Assets		**5.75%**
13. Rate of Return for the Year on Fair Value of Assets (reported by investment consultant-net of inv. exp.)		**-8.88%**

* Annual Return to be Spread calculation based on assumed 8.25% investment return which includes an assumption that all expenses and revenues are on average paid at mid-year

Section 2.4
Historical Asset Rate of Return

Year Ending December 31	Fair Value Annual Recognized Rate of Return [1]	Actuarial Value Annual Recognized Rate of Return
2022	-8.88%	5.75%
2021	17.60%	9.82%
2020	7.60%	7.84%
2019	15.70%	7.57%
2018	-3.53%	6.99%
2017	14.40%	9.10%

1 As reported by the Plan.

Section 2.5
Forecast of Expected Benefit Payments

Year Ending December 31	Active Members	Inactive Members	Total Payments
2023	15,874,843	315,473,674	331,348,517
2024	31,223,845	306,134,507	337,358,351
2025	46,986,450	298,310,316	345,296,766
2026	62,916,138	290,165,701	353,081,839
2027	78,493,233	281,750,391	360,243,624
2028	93,378,687	273,007,292	366,385,978
2029	107,601,813	263,945,746	371,547,559
2030	121,105,566	254,738,594	375,844,160
2031	133,870,275	245,211,588	379,081,862
2032	145,263,522	235,452,340	380,715,863
2033	157,815,322	225,472,346	383,287,667
2034	169,432,512	215,437,933	384,870,444
2035	179,768,155	205,320,032	385,088,187
2036	188,767,145	195,111,090	383,878,236
2037	196,520,952	184,898,675	381,419,627
2038	203,400,077	174,694,546	378,094,623
2039	209,403,997	164,471,675	373,875,672
2040	214,782,018	154,333,504	369,115,522
2041	219,542,233	144,335,986	363,878,220
2042	223,877,448	134,523,570	358,401,018
2043	227,646,019	124,974,932	352,620,951
2044	231,208,815	115,716,570	346,925,385
2045	234,446,154	106,726,169	341,172,323
2046	237,393,079	98,040,635	335,433,714
2047	239,843,565	89,669,618	329,513,183
2048	241,998,298	81,654,150	323,652,448
2049	243,696,574	74,048,842	317,745,416
2050	245,236,983	66,850,958	312,087,941
2051	246,325,500	60,080,144	306,405,644
2052	246,773,562	53,733,905	300,507,467
2053	246,644,382	47,815,739	294,460,121
2054	245,637,330	42,331,571	287,968,901
2055	244,140,734	37,277,736	281,418,471
2056	241,682,907	32,646,998	274,329,905
2057	238,085,637	28,429,317	266,514,953
2058	233,389,314	24,612,058	258,001,372
2059	227,530,184	21,179,617	248,709,800
2060	220,826,743	18,113,647	238,940,390
2061	213,340,295	15,393,187	228,733,482
2062	205,191,058	12,995,372	218,186,430
2063	196,508,618	10,896,590	207,405,208
2064	187,443,333	9,072,743	196,516,076
2065	178,145,052	7,499,926	185,644,977
2066	168,693,707	6,154,499	174,848,206
2067	159,235,567	5,013,155	164,248,722
2068	149,774,828	4,053,104	153,827,932
2069	140,404,444	3,252,473	143,656,917
2070	131,190,995	2,590,614	133,781,609
2071	122,173,156	2,048,310	124,221,466
2072	113,386,348	1,607,985	114,994,333
2073	104,861,559	1,253,657	106,115,216
2074	96,624,012	971,065	97,595,077
2075	88,693,360	747,645	89,441,004

Section 2.5
Forecast of Expected Benefit Payments, continued

Year Ending December 31	Active Members	Inactive Members	Total Payments
2076	81,086,414	572,480	81,658,895
2077	73,818,209	436,185	74,254,394
2078	66,895,838	330,850	67,226,688
2079	60,331,784	249,947	60,581,731
2080	54,134,718	188,158	54,322,876
2081	48,311,831	141,196	48,453,028
2082	42,867,987	105,669	42,973,656
2083	37,806,137	78,906	37,885,043
2084	33,126,666	58,836	33,185,502
2085	28,827,600	43,848	28,871,448
2086	24,903,457	32,704	24,936,161
2087	21,345,224	24,448	21,369,673
2088	18,141,504	18,352	18,159,855
2089	15,278,933	13,852	15,292,785
2090	12,743,002	10,521	12,753,523
2091	10,517,504	8,036	10,525,540
2092	8,584,185	6,162	8,590,346
2093	6,923,216	4,732	6,927,948
2094	5,513,496	3,627	5,517,123
2095	4,332,722	2,761	4,335,483
2096	3,357,568	2,077	3,359,646
2097	2,564,165	1,538	2,565,704
2098	1,928,673	1,116	1,929,790
2099	1,427,976	790	1,428,766
2100	1,040,192	542	1,040,734
2101	745,112	361	745,473
2102	524,639	232	524,871
2103	362,980	143	363,123
2104	246,668	85	246,752
2105	164,577	48	164,625
2106	107,767	26	107,793
2107	69,237	14	69,251
2108	43,629	7	43,636
2109	26,956	4	26,959
2110	16,325	2	16,327
2111	9,681	1	9,681
2112	5,615	0	5,616
2113	3,184	0	3,184
2114	1,766	0	1,766
2115	956	0	956
2116	503	0	503
2117	256	0	256
2118	126	0	126
2119	61	0	61
2120	28	0	28

Note: Forecast based on the present members without assumption about replacement members

Section 3 - Accounting Information

Section 3.1
Actuarial Methods and Assumptions for GASB 67/68 Disclosure Purposes

The total pension liability as of December 31, 2022 was determined by rolling forward the total pension liability as of January 1, 2022 to December 31, 2022 using the following actuarial methods and assumptions, applied to all periods included in the measurement. All other assumptions such as retirement rates, termination rates, and disability rates used to determine the total pension liability are set forth in Section 6 - Basis of the Actuarial Valuation.

Valuation Date:	January 1, 2022
Actuarial Cost Method:	Entry Age Normal – Level Percentage of Pay
Amortization Method:	For pension expense; the difference between expected and actual liability experience and changes of assumptions are amortized over the average of the expected remaining service lives of all members. The difference between projected and actual earnings is amortized over a closed period of five years.
Mortality:	Active members and *Healthy pensioners,* including beneficiaries prior to their associated member's death*:* The SOA Public Mortality General Below Median generational with Improvement Scale MP-2018 with an adjustment for female participants. *Disabled pensioners:* The SOA Public Disability Mortality General Below Median generational with Improvement Scale MP-2018. Survivors*:* The SOA Public Survivor Mortality General Below Median generational with Improvement Scale MP-2018.
Experience Study:	The actuarial assumptions used were based on the results of an actuarial experience study for the period January 1, 2013 through December 31, 2017, which have been adopted by the Board.

Section 3.2
Schedule of Expected Changes in Net Pension Liability as of December 31, 2022

The GASB Statement No. 67 Change in Net Pension Liability

Schedule of Changes in Net Pension Liability		
Fiscal Year Ending	**December 31, 2022**	**December 31, 2021**
Total Pension Liability		
Service Cost	$ 52,757,421	$ 51,675,474
Interest	309,343,260	303,111,459
Changes of Benefit Terms	-	-
Difference between Expected and Actual Experience	32,650,177	38,032,686
Change of Assumptions	-	-
Benefit Payments, including Refund of Member Contributions	(328,668,360)	(308,461,220)
Net Change in Total Pension Liability	66,082,498	84,358,399
Total Pension Liability - Beginning of Year	$ 3,857,935,640	$ 3,773,577,241
Total Pension Liability - End of Year	$ 3,924,018,138	$ 3,857,935,640
Plan Fiduciary Net Position		
Employer Contributions	$ 142,475,778	$ 136,907,904
Member Contributions	92,134,551	87,896,658
Net Investment Income	(190,004,983)	333,301,626
Benefit Payments, including Refund of Member Contributions	(328,668,360)	(308,461,220)
Administrative Expenses	(2,488,345)	(2,327,614)
Other	-	-
Net Change in Plan Fiduciary Net Position	(286,551,359)	247,317,354
Plan Fiduciary Net Position - Beginning of Year	$ 2,188,483,775	$ 1,941,166,421
Plan Fiduciary Net Position - End of Year	$ 1,901,932,416	$ 2,188,483,775

Section 3.3
Net Pension Liability (Asset)

The GASB Statement No. 67 Net Pension Liability

Net Pension Liability (Asset)		
Valuation Date	**Dec. 31, 2022**	**Dec. 31, 2021**
Total Pension Liability	$ 3,924,018,138	$ 3,857,935,640
Plan Fiduciary Net Position	1,901,932,416	2,188,483,775
Net Pension Liability (Asset)	$ 2,022,085,722	$ 1,669,451,865
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability (Asset)	48.47%	56.73%

Section 3.4
Sensitivity

The GASB Statement No. 67 Sensitivity of Net Pension Liability

Sensitivity of the Net Pension Liability to Changes in the Discount Rate			
December 31, 2022	**1% Decrease**	**Current**	**1% Increase**
Discount Rate	7.25%	8.25%	9.25%
Net Pension Liability (Asset)	$ 2,392,229,180	$ 2,022,085,722	$ 1,704,492,367

The discount rate used to measure the total pension liability was 8.25%. The projection of cash flows used to determine the discount rate assumed that the Plan's contributions will continue to follow the current funding policy. Based on those assumptions, the Plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. In the event of benefit payments not covered by the Plan's fiduciary net position, a municipal bond rate of 4.31% would be used to discount the benefit payments not covered by the Plan's fiduciary net position. The 4.31% rate equals the S&P Municipal Bond 20-Year High Grade Index at December 31, 2022. The rate was 2.25% as of December 31, 2021. Please see the supporting exhibits for additional detail.

Long-term expected rate of return. The long-term expected rate of return on system investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of system investment expense and inflation) are developed for each major asset class. These ranges 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 and by adding expected inflation. Best estimates of long-term geometric rates of return for each major asset class included in the system's target asset allocation as of December 31, 2022 are summarized below:

Asset Class	Long-Term Expected Rate of Return
Inflation	2.72%
Fixed Income	4.36%
Domestic Equity	8.45%
International Equity	8.97%
Private Equity	12.90%
Real Estate	7.28%
Infrastructure	6.37%

Section 3.5
Pension Expense

The GASB Statement No. 68 Pension Expense

Pension Expense		
Measurement Year Ending	December 31, 2022	December 31, 2021
Service Cost	$ 52,757,421	$ 51,675,474
Interest	309,343,260	303,111,459
Projected Earnings on Plan Investments	(176,646,290)	(156,669,662)
Member Contributions	(92,134,551)	(87,896,658)
Administrative Expense	2,488,345	2,327,614
Current Period:		
Changes of Benefit Terms	-	-
Changes of Assumptions	-	-
Difference between Expected and Actual Experience	8,061,773	9,120,549
Difference between Expected and Actual Investment Earnings	73,330,255	(35,326,393)
Recognition of Prior Years:		
Deferred Inflows	(62,877,135)	(49,547,361)
Deferred Outflows	83,466,214	76,566,956
Others	-	-
Total Pension Expense	$ 197,789,292	$ 113,361,978

Section 3.6
Supporting Exhibits

Schedule of Deferred Inflows and Outflows

Amortization of the Difference Between Expected and Actual Experience

Measurement Date	2017	2018	2019	2020	2021	2022	Outflows	Inflows	Total
Amount Established	$ 13,679,323	$ 7,455,309	$ 41,530,311	$ 62,819,793	$ 38,032,686	$ 32,650,177			
Recognition Period	4.42	4.45	4.13	4.10	4.17	4.05			
Amount Recognized in FY									
2017	$ 3,094,869						$ 3,094,869	$ -	$ 3,094,869
2018	3,094,869	$ 1,675,350					4,770,219	-	4,770,219
2019	3,094,869	1,675,350	$ 10,055,766				14,825,985	-	14,825,985
2020	3,094,869	1,675,350	10,055,766	$ 15,321,901			30,147,886	-	30,147,886
2021	1,299,847	1,675,350	10,055,766	15,321,901	$ 9,120,549		37,473,413	-	37,473,413
2022	-	753,909	10,055,766	15,321,901	9,120,549	$ 8,061,773	43,313,898	-	43,313,898
2023	-	-	1,307,247	15,321,901	9,120,549	8,061,773	33,811,470	-	33,811,470
2024	-	-	-	1,532,189	9,120,549	8,061,773	18,714,511	-	18,714,511
2025	-	-	-	-	1,550,490	8,061,773	9,612,263	-	9,612,263
2026	-	-	-	-	-	403,085	403,085	-	403,085
Deferred Balance at 12/31									
2017	$ 10,584,454						$ 10,584,454	$ -	$ 10,584,454
2018	7,489,585	$ 5,779,959					13,269,544	-	13,269,544
2019	4,394,716	4,104,609	$ 31,474,545				39,973,870	-	39,973,870
2020	1,299,847	2,429,259	21,418,779	$ 47,497,892			72,645,777	-	72,645,777
2021	-	753,909	11,363,013	32,175,991	$ 28,912,137		73,205,050	-	73,205,050
2022	-	-	1,307,247	16,854,090	19,791,588	$ 24,588,404	62,541,329	-	62,541,329
2023	-	-	-	1,532,189	10,671,039	16,526,631	28,729,859	-	28,729,859
2024	-	-	-	-	1,550,490	8,464,858	10,015,348	-	10,015,348
2025	-	-	-	-	-	403,085	403,085	-	403,085

Amortization of Changes in Assumptions

Measurement Date	2017	2018	2019	2020	2021	2022	Outflows	Inflows	Total
Amount Established	$ -	$ (24,726,963)	$ -	$ -	$ -	$ -			
Recognition Period		4.45							
Amount Recognized in FY									
2017	$ -						$ -	$ -	$ -
2018	-	$ (5,556,621)					-	(5,556,621)	(5,556,621)
2019	-	(5,556,621)	$ -				-	(5,556,621)	(5,556,621)
2020	-	(5,556,621)	-	$ -			-	(5,556,621)	(5,556,621)
2021	-	(5,556,621)	-	-	$ -		-	(5,556,621)	(5,556,621)
2022	-	(2,500,479)	-	-	-	$ -	-	(2,500,479)	(2,500,479)
2023	-	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-	-
2026	-	-	-	-	-	-	-	-	-
Deferred Balance at 12/31									
2017	$ -						$ -	$ -	$ -
2018	-	$ (19,170,342)					-	(19,170,342)	(19,170,342)
2019	-	(13,613,721)	$ -				-	(13,613,721)	(13,613,721)
2020	-	(8,057,100)	-	$ -			-	(8,057,100)	(8,057,100)
2021	-	(2,500,479)	-	-	$ -		-	(2,500,479)	(2,500,479)
2022	-	-	-	-	-	$ -	-	-	-
2023	-	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-	-

Amortization of the Difference Between Projected and Actual Earnings

Measurement Date	2017	2018	2019	2020	2021	2022	Outflows	Inflows	Total
Amount Established	$ (94,702,377)	$ 211,667,813	$(125,251,315)	$ 29,402,641	$ (176,631,965)	$ 366,651,273			
Recognition Period	5.00	5.00	5.00	5.00	5.00	5.00			
Amount Recognized in FY									
2017	$ (18,940,475)						$ -	$ (18,940,475)	$ (18,940,475)
2018	(18,940,475)	$ 42,333,563					42,333,563	(18,940,475)	23,393,088
2019	(18,940,475)	42,333,563	$ (25,050,263)				42,333,563	(43,990,738)	(1,657,175)
2020	(18,940,475)	42,333,563	(25,050,263)	$ 5,880,528			48,214,091	(43,990,738)	4,223,353
2021	(18,940,477)	42,333,563	(25,050,263)	5,880,528	$ (35,326,393)		48,214,091	(79,317,133)	(31,103,042)
2022	-	42,333,561	(25,050,263)	5,880,528	(35,326,393)	$ 73,330,255	121,544,344	(60,376,656)	61,167,688
2023	-	-	(25,050,263)	5,880,528	(35,326,393)	73,330,255	79,210,783	(60,376,656)	18,834,127
2024	-	-	-	5,880,529	(35,326,393)	73,330,255	79,210,784	(35,326,393)	43,884,391
2025	-	-	-	-	(35,326,393)	73,330,255	73,330,255	(35,326,393)	38,003,862
2026	-	-	-	-	-	73,330,253	73,330,253	-	73,330,253
Deferred Balance at 12/31									
2017	$ (75,761,902)						$ -	$ (75,761,902)	$ (75,761,902)
2018	(56,821,427)	$ 169,334,250					169,334,250	(56,821,427)	112,512,823
2019	(37,880,952)	127,000,687	$(100,201,052)				127,000,687	(138,082,004)	(11,081,317)
2020	(18,940,477)	84,667,124	(75,150,789)	$ 23,522,113			108,189,237	(94,091,266)	14,097,971
2021	-	42,333,561	(50,100,526)	17,641,585	$ (141,305,572)		59,975,146	(191,406,098)	(131,430,952)
2022	-	-	(25,050,263)	11,761,057	(105,979,179)	$ 293,321,018	305,082,075	(131,029,442)	174,052,633
2023	-	-	-	5,880,529	(70,652,786)	219,990,763	225,871,292	(70,652,786)	155,218,506
2024	-	-	-	-	(35,326,393)	146,660,508	146,660,508	(35,326,393)	111,334,115
2025	-	-	-	-	-	73,330,253	73,330,253	-	73,330,253

Schedule of CTA Contributions ($'s in 000's)

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Employer Portion of Required Contribution on a statutory basis	$ 134,547	$ 131,630	$ 132,232	$ 116,367	$ 112,265	$ 106,662	$ 82,001	$ 81,731	$ 80,488	$ 76,899
Actual Employer Contributions	$ 142,476	$ 136,908	$ 135,832	$ 121,668	$ 117,115	$ 104,523	$ 83,855	$ 82,800	$ 82,268	$ 79,518
Contribution deficiency (excess)	$ (7,929)	$ (5,278)	$ (3,600)	$ (5,301)	$ (4,850)	$ 2,139	$ (1,854)	$ (1,069)	$ (1,780)	$ (2,619)
Covered payroll	$ 651,652	$ 637,524	$ 640,442	$ 645,799	$ 623,037	$ 595,047	$ 575,444	$ 573,548	$ 564,827	$ 550,616
Contributions as a percentage of covered payroll	20.65%	20.65%	20.65%	18.02%	18.02%	17.93%	14.25%	14.25%	14.25%	13.97%

Notes to Schedule -

Valuation Date: Actuarially determined contribution rates are calculated as of January 1, one year prior to the end of the fiscal year in which contributions are reported

Other information:

1. The demographic assumptions were updated in 2019 to bring the assumptions more in line with actual plan experience.

Section 3.6
Supporting Exhibits, continued

Projection of Fiduciary Net Position

Year	Projected Beginning Fiduciary Net Position (a)	Projected Total Contributions* (b)	Projected Benefit Payments (c)	Projected Administrative Expense (d)	Projected Investment Earnings (e)	Projected Ending Fiduciary Net Position (f) = (a) + (b) - (c) - (d) + (e)
2023	1,901,932,416	230,667,759	331,398,280	2,500,000	152,735,545	1,951,437,441
2024	1,951,437,441	229,882,863	337,558,115	2,550,000	156,536,895	1,997,749,084
2025	1,997,749,084	229,240,831	345,728,667	2,601,000	159,999,228	2,038,659,476
2026	2,038,659,476	228,800,737	353,827,126	2,653,020	163,026,996	2,074,007,063
2027	2,074,007,063	228,945,099	361,355,307	2,706,080	165,642,480	2,104,533,254
2028	2,104,533,254	229,828,995	367,890,549	2,760,202	167,930,203	2,131,641,701
2029	2,131,641,701	230,998,586	373,452,883	2,815,406	169,986,808	2,156,358,806
2030	2,156,358,806	232,279,038	378,146,991	2,871,714	171,885,669	2,179,504,808
2031	2,179,504,808	234,186,274	381,779,207	2,929,148	173,723,148	2,202,705,874
2032	2,202,705,874	236,580,894	383,781,526	2,987,731	175,650,728	2,228,168,239
2033	2,228,168,239	238,688,687	386,742,368	3,047,486	177,714,466	2,254,781,538
2034	2,254,781,538	241,627,450	388,682,264	3,108,436	179,947,986	2,284,566,274
2035	2,284,566,274	245,297,021	389,220,517	3,170,604	182,529,320	2,320,001,494
2036	2,320,001,494	249,748,760	388,289,768	3,234,017	185,667,790	2,363,894,260
2037	2,363,894,260	254,855,740	386,074,480	3,298,697	189,582,387	2,418,959,210
2038	2,418,959,210	260,369,957	382,970,149	3,364,671	194,471,048	2,487,465,395
2039	2,487,465,395	266,196,494	378,950,606	3,431,964	200,518,190	2,571,797,509
2040	2,571,797,509	272,481,812	374,371,081	3,500,604	207,912,108	2,674,319,745
2041	2,674,319,745	279,102,692	369,299,530	3,570,616	216,840,117	2,797,392,408
2042	2,797,392,408	285,951,313	363,978,031	3,642,028	227,482,794	2,943,206,456
2043	2,943,206,456	293,035,950	358,340,667	3,714,868	240,023,891	3,114,210,762
2044	3,114,210,762	300,334,309	352,782,518	3,789,166	254,648,564	3,312,621,951
2045	3,312,621,951	307,839,440	347,161,491	3,864,949	271,545,148	3,540,980,099
2046	3,540,980,099	315,627,853	341,544,874	3,942,248	290,923,571	3,802,044,400
2047	3,802,044,400	323,752,873	335,733,137	4,021,093	313,021,686	4,099,064,729
2048	4,099,064,729	332,247,191	329,972,971	4,101,515	338,098,958	4,435,336,392
2049	4,435,336,392	341,085,347	324,152,477	4,183,545	366,430,741	4,814,516,458
2050	4,814,516,458	350,274,799	318,570,722	4,267,216	398,306,952	5,240,260,271
2051	5,240,260,271	359,801,062	312,957,419	4,352,561	434,039,497	5,716,790,851
2052	5,716,790,851	369,605,515	307,114,711	4,439,612	473,982,406	6,248,824,449
2053	6,248,824,449	379,709,547	301,096,341	4,528,404	518,523,458	6,841,432,709
2054	6,841,432,709	390,182,424	294,620,630	4,618,972	568,095,253	7,500,470,784
2055	7,500,470,784	400,949,296	288,070,472	4,711,351	623,162,332	8,231,800,588
2056	8,231,800,588	412,142,567	280,945,706	4,805,579	684,233,877	9,042,425,748
2057	9,042,425,748	423,856,231	273,057,350	4,901,690	751,899,127	9,940,222,066
2058	9,940,222,066	436,130,161	264,436,129	4,999,724	826,808,205	10,933,724,579
2059	10,933,724,579	448,965,668	255,002,694	5,099,718	909,668,511	12,032,256,345
2060	12,032,256,345	462,358,929	245,063,092	5,201,713	1,001,236,666	13,245,587,135

*The contributions displayed contain both employer and employee contributions.

Since the projected investment earnings become greater than the projected benefit payments including administrative expenses, the Plan's fiduciary net position is sufficient to cover all the projected future benefit payments of current Plan members.

Section 3.6
Supporting Exhibits, continued

Actuarial Present Value of Projected Benefit Payments

Year	Projected Beginning Fiduciary Net Position	Projected Benefit Payments	Funded Portion of Projected Benefit Payments	Unfunded Portion of Projected Benefit Payments	8.25% Present Value of Funded Benefit Payments	4.31% Present Value of Unfunded Benefit Payments	8.25% Present Value of Benefit Payments Using Single Discount Rate
2023	1,901,932,416	331,398,280	331,398,280	-	306,141,598	-	306,141,598
2024	1,951,437,441	337,558,115	337,558,115	-	288,066,491	-	288,066,491
2025	1,997,749,084	345,728,667	345,728,667	-	272,553,446	-	272,553,446
2026	2,038,659,476	353,827,126	353,827,126	-	257,679,284	-	257,679,284
2027	2,074,007,063	361,355,307	361,355,307	-	243,105,572	-	243,105,572
2028	2,104,533,254	367,890,549	367,890,549	-	228,639,468	-	228,639,468
2029	2,131,641,701	373,452,883	373,452,883	-	214,407,751	-	214,407,751
2030	2,156,358,806	378,146,991	378,146,991	-	200,556,808	-	200,556,808
2031	2,179,504,808	381,779,207	381,779,207	-	187,051,470	-	187,051,470
2032	2,202,705,874	383,781,526	383,781,526	-	173,702,078	-	173,702,078
2033	2,228,168,239	386,742,368	386,742,368	-	161,701,779	-	161,701,779
2034	2,254,781,538	388,682,264	388,682,264	-	150,127,365	-	150,127,365
2035	2,284,566,274	389,220,517	389,220,517	-	138,877,842	-	138,877,842
2036	2,320,001,494	388,289,768	388,289,768	-	127,986,828	-	127,986,828
2037	2,363,894,260	386,074,480	386,074,480	-	117,558,090	-	117,558,090
2038	2,418,959,210	382,970,149	382,970,149	-	107,725,481	-	107,725,481
2039	2,487,465,395	378,950,606	378,950,606	-	98,470,971	-	98,470,971
2040	2,571,797,509	374,371,081	374,371,081	-	89,866,950	-	89,866,950
2041	2,674,319,745	369,299,530	369,299,530	-	81,893,335	-	81,893,335
2042	2,797,392,408	363,978,031	363,978,031	-	74,561,918	-	74,561,918
2043	2,943,206,456	358,340,667	358,340,667	-	67,812,553	-	67,812,553
2044	3,114,210,762	352,782,518	352,782,518	-	61,672,726	-	61,672,726
2045	3,312,621,951	347,161,491	347,161,491	-	56,064,729	-	56,064,729
2046	3,540,980,099	341,544,874	341,544,874	-	50,953,973	-	50,953,973
2047	3,802,044,400	335,733,137	335,733,137	-	46,269,689	-	46,269,689
2048	4,099,064,729	329,972,971	329,972,971	-	42,010,015	-	42,010,015
2049	4,435,336,392	324,152,477	324,152,477	-	38,123,776	-	38,123,776
2050	4,814,516,458	318,570,722	318,570,722	-	34,611,827	-	34,611,827
2051	5,240,260,271	312,957,419	312,957,419	-	31,410,584	-	31,410,584
2052	5,716,790,851	307,114,711	307,114,711	-	28,474,983	-	28,474,983
2053	6,248,824,449	301,096,341	301,096,341	-	25,789,352	-	25,789,352
2054	6,841,432,709	294,620,630	294,620,630	-	23,311,499	-	23,311,499
2055	7,500,470,784	288,070,472	288,070,472	-	21,056,097	-	21,056,097
2056	8,231,800,588	280,945,706	280,945,706	-	18,970,275	-	18,970,275
2057	9,042,425,748	273,057,350	273,057,350	-	17,032,453	-	17,032,453
2058	9,940,222,066	264,436,129	264,436,129	-	15,237,587	-	15,237,587
2059	10,933,724,579	255,002,694	255,002,694	-	13,574,139	-	13,574,139
2060	12,032,256,345	245,063,092	245,063,092	-	12,050,845	-	12,050,845

Since the projected investment earnings become greater than the projected benefit payments including administrative expenses, the Plan's fiduciary net position is sufficient to cover all the projected future benefit payments of current Plan members.

Section 4 - Actuarial Funding Projections

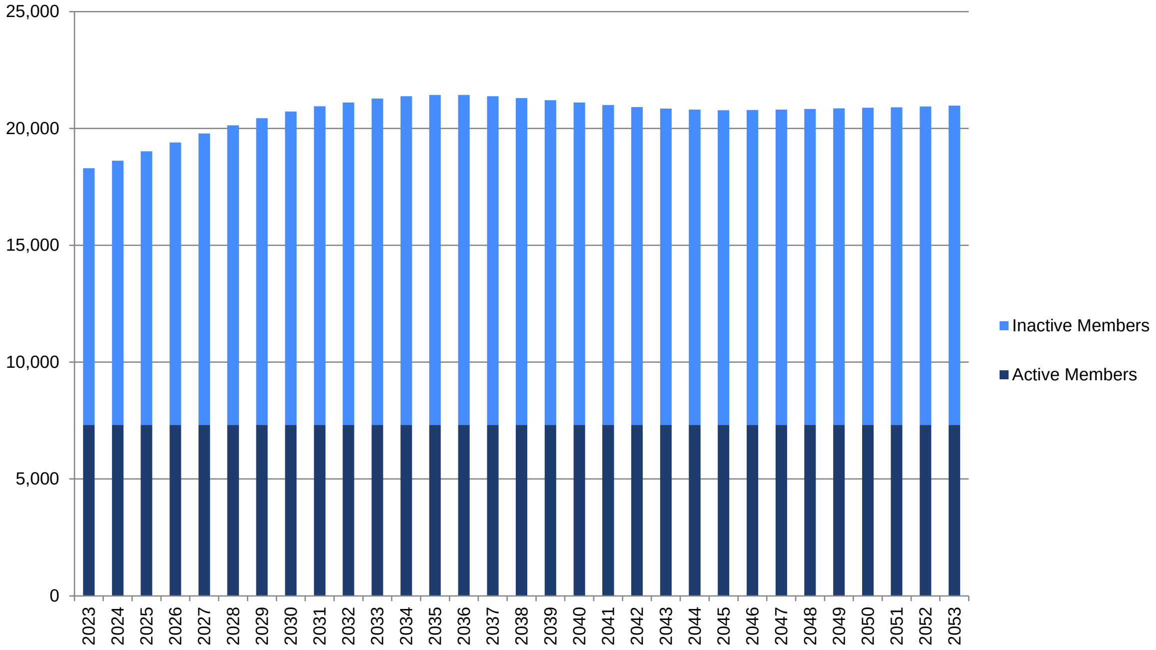
Section 4.1
Projection Assumptions and Methods

Key Assumptions

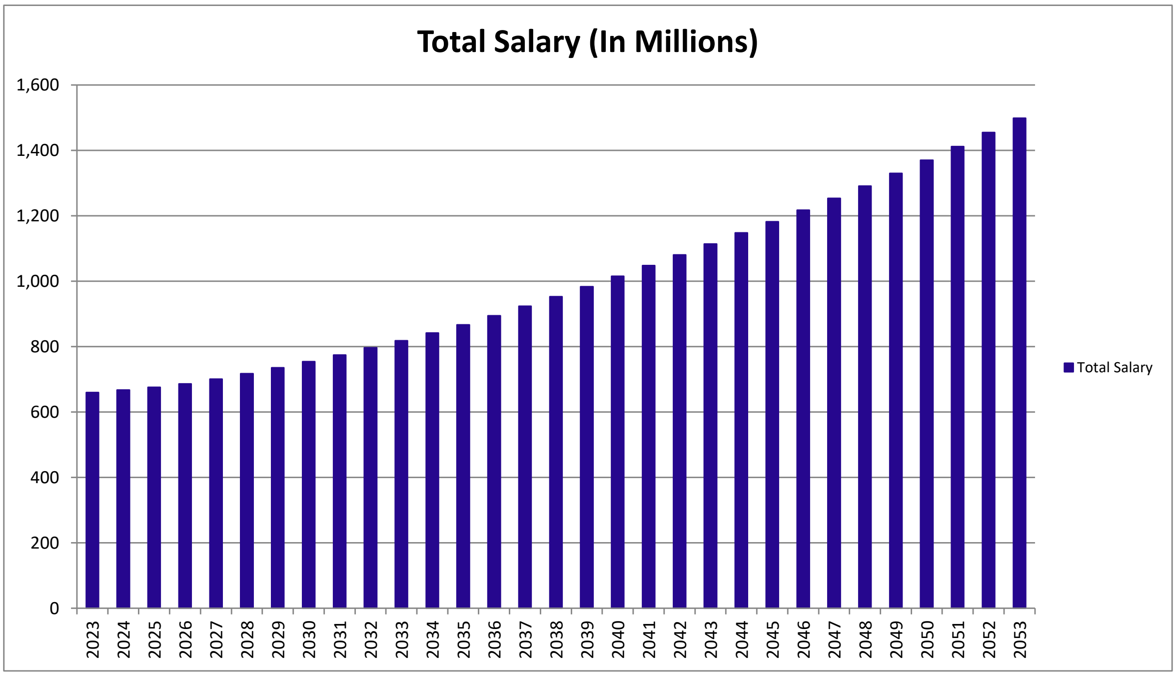
- 8.25% investment return on the Fair Value of Assets in all future years.
- The Actuarial Value of Assets is based on a five-year smoothing method.
- Actuarial assumptions and methods as described in Section 6. All future demographic experience is assumed to be exactly realized.
- The statutory contribution is contributed each year.
- Projections assume a 0% increase in the total active member population. All new future members are expected to enter the plan after 12 months of continuous service and contribution rates are determined as a percent of total payroll.

Section 4.2
Membership Projection

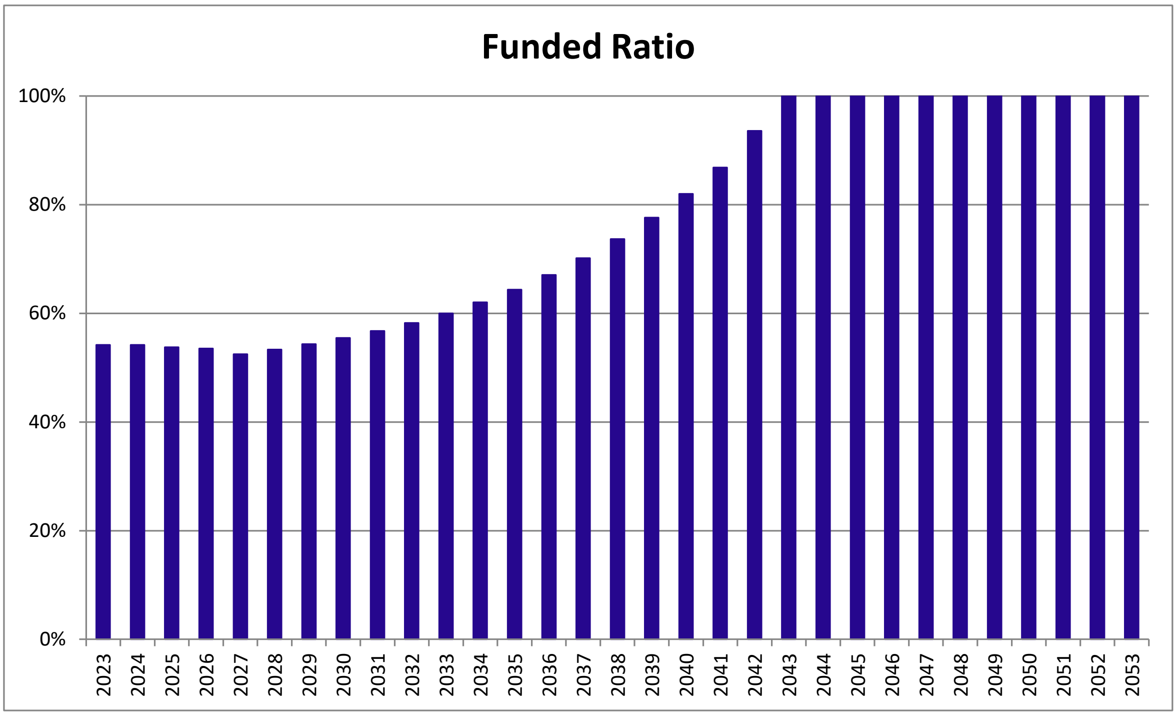
Projected Member Count



Projected Current and New Member Payroll



Section 4.3
Projection of Funded Status



Section 5 - Member Data

Section 5.1
Summary of Membership Data as of January 1, 2023
(Annual Salaries and Annual Benefits $ in 000's)

Active Employees

Item	Male	Female	Total
Number of Members [1]	5,040	2,369	7,409
Annual Salaries [2]	$479,600	$179,994	$659,594
Average Age [1]	49.19	47.61	48.69
Average Service [1]	12.95	11.33	12.43

Terminated Vested Employees

Item	Male	Female	Total
Number of Members	104	46	150
Annual Accrued Benefit	$2,770	$1,084	$3,854
Average Age	56.81	57.84	57.12

Retirees and Beneficiaries

Item	Male	Female	Total
Number of Members	6,511	2,865	9,376
Annual Retirement Benefit	$221,177	$66,775	$287,952
Average Age	72.89	72.54	72.78

Disability Allowances

Item	Male	Female	Total
Number of Members	716	649	1,365
Annual Disability Benefit	$15,208	$12,155	$27,363
Average Age	65.3	63.6	64.49

1 Active statistics include all participants who are actively employed, 10 participants who are on leave and 93 participants who have opted out of participating in the Plan and are only entitled to a return of their contributions.

2 The salary information for the 93 participants who have opted out of participating in the Plan is not included.

Section 5.2
Age and Service Distribution of Active Members as of January 1, 2023

Number of Participants

	Years of Service									
Age	**Under 5**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**Over 40**	**Total**
Under 25	21	-	-	-	-	-	-	-	-	21
25-29	198	25	-	-	-	-	-	-	-	223
30-34	365	222	23	3	-	-	-	-	-	613
35-39	299	319	106	59	2	-	-	-	-	785
40-44	277	314	119	218	110	1	-	-	-	1,039
45-49	197	297	114	178	233	69	-	-	-	1,088
50-54	193	280	147	236	320	206	19	1	-	1,402
55-59	116	223	102	170	308	174	59	7	-	1,159
60-64	66	156	88	116	242	102	33	6	2	811
Over 65	18	67	34	34	54	31	12	7	11	268
Total	1,750	1,903	733	1,014	1,269	583	123	21	13	7,409

Section 5.3
Retirement Retiree and Beneficiary Data as of January 1, 2023

Number and Average Annual Allowance

Age Last Birthday	Number	Annual Allowance	Average Allowance
Retired Annuitants			
Under 50	23	$1,445,120	$62,831
50-54	133	$7,274,630	$54,696
55-59	553	$27,131,930	$49,063
60-64	895	$39,311,915	$43,924
65-69	1,516	$56,960,382	$37,573
70-74	1,792	$55,441,281	$30,938
75-79	1,684	$47,565,154	$28,245
Over 79	1,532	$35,756,224	$23,340
Total	8,128	$270,886,636	$33,328
Surviving Spouses			
Under 50	7	$107,949	$15,421
50-54	24	$420,088	$17,504
55-59	66	$943,418	$14,294
60-64	129	$1,864,212	$14,451
65-69	157	$2,422,398	$15,429
70-74	223	$3,419,619	$15,335
75-79	229	$3,279,650	$14,322
Over 79	413	$4,607,964	$11,157
Total	1,248	$17,065,298	$13,674
Disability Allowances			
Under 50	93	$1,865,862	$20,063
50-54	169	$3,809,927	$22,544
55-59	213	$4,871,174	$22,869
60-64	281	$6,570,626	$23,383
65-69	200	$4,205,588	$21,028
70-74	170	$2,763,316	$16,255
75-79	141	$2,056,425	$14,585
Over 79	98	$1,219,605	$12,445
Total	1,365	$27,362,523	$20,046

Section 5.4
Inactive Vested Employee Data as of January 1, 2023

Number and Average Accrued Benefit

Age Last Birthday	Number	Annual Accrued Benefit	Average Accrued Benefit
Terminated Vested [1]			
Under 35	1	-	-
35-39	3	$46,573	$23,287
40-44	11	$272,294	$24,754
45-49	7	$135,739	$27,148
50-54	25	$637,416	$26,559
55-59	36	$852,989	$25,848
60-64	59	$1,808,595	$30,654
65-69	6	$69,483	$11,580
Over 70	2	$31,808	$15,904
Total	150	$3,854,897	$27,147

1 Number of deferred vested members includes 8 in 2023 who were pending cashouts after the valuation date. These members are not included in the calculation of the average benefit.

Section 6 - Basis of the Actuarial Valuation

Section 6.1
Summary of Plan and Contribution Provisions

Eligibility—All full-time permanent employees of the Chicago Transit Authority are included in the Plan after completing 12 months of continuous service unless specifically excluded by the terms of a collective bargaining agreement. Exempt non-vested employees may opt out of the Plan. Chicago Transit Authority Board members are not included.

Contributions—The Chicago Transit Authority will contribute a percent of compensation for all participating employees and each participating employee will contribute a percent of his compensation to the Plan:

Annual Contributions to the Plan (Percentage of Compensation)	
Authority	**Employees**
21.590%	13.795%

For years through 2040, the amount paid by the Authority with respect to debt service on bonds issued for contribution to the Plan shall be treated as a credit against the amount of required contribution up to an amount not to exceed six percent of compensation paid by the Authority in the following year. The amount paid in debt service is always greater than six percent of projected compensation.

In order to be eligible for the credit, the debt service payment may not be paid with the proceeds of bonds or notes issued by the CTA for any calendar year after 2008. Buck has confirmed that the debt service payment for the year triggering the credit was not paid with the proceeds of bonds or notes issued by the CTA for any calendar year after 2008.

Minimum contributions as set forth elsewhere in this report may also apply.

Normal Retirement—The normal retirement age is 65. For employees retiring on or after January 1, 2001 the annual normal retirement pension is equal to the sum of (a) and (b) below, but not greater than 70.0% of the employee's average annual compensation:

(a) 1% of the employee's past service compensation as of May 31, 1948, for each full year of continuous service prior to June 1, 1949, plus
(b) 2.15% of average annual compensation for each year (and fraction of completed calendar months) of continuous service after June 1, 1949.

Average annual compensation is equal to the highest average compensation over any four calendar years out of the final 10 calendar years prior to normal retirement (or actual retirement, if later). If an employee has at least 20 years of service, his minimum annual pension is $2,220.

Early Retirement:

Employees hired before January 18, 2008: An employee may retire early after attaining age 55 and completing at least three years of continuous service, or after completion of 25 years of continuous service. The early retirement pension is equal to the accrued normal retirement pension based on compensation and service at early retirement, reduced by 5% for each year or fraction younger than age 65. The 5% per year reduction is not applied if the employee has at least 25 years of service. Employees hired after September 5, 2001 may retire early with unreduced benefits after attaining age 55 and completing at least 25 years of service.

Section 6.1
Summary of Plan and Contribution Provisions, continued

Employees hired on and after January 18, 2008: An employee may retire with unreduced benefits upon attainment of age 64 with 25 years of service. An employee may retire with a benefit reduced as described above upon attainment of age 55 with 10 years of continuous service.

Disability Allowance:

An employee is eligible for a disability allowance if he becomes disabled after completing 10 years of service, or if his disability after completing five years of service is covered under the Workmen's Compensation Act. An employee is disabled if he either (a) is totally and permanently disabled or (b) is unable to return to work at their same job after receiving 26 weeks of benefits under the Authority's Group Accident and Sickness Insurance or from the Authority under the Workmen's Compensation Act. The disability allowance is equal to the normal retirement pension based on compensation and service at disability subject to a minimum annual pension of $4,800.

Death Benefits:

If an employee dies prior to retirement or disability and after one year of service, his contributions, accumulated with interest, are paid to his beneficiary. "Interest" is equal to the rate of interest earned by the Fund (to a maximum of 2%) prior to January 1, 1971, 1/2 of the rate of interest earned by the Fund (to a maximum of 3%) between January 1, 1971, and January 1, 1980, and 3% after December 31, 1979. If an employee dies after 90 days of service but prior to one year of service, his contributions, without interest, are paid to his beneficiary; and if he dies prior to 90 days of service, his contributions are not refunded.

If an employee is eligible for early retirement, he is automatically covered by a surviving spouse benefit, payable upon his death prior to retirement, in lieu of a return of his contributions. The spouse benefit is equal to 1/2 of the pension which would have been payable to the employee if he had retired on the first day of the month of his death and had elected an optional form of pension providing 1/2 of his reduced pension to his surviving spouse. Employees may elect not to be covered by this option and provide for the payment of their contributions with interest to their beneficiary in lieu thereof.

If an employee dies after his retirement pension has commenced, his beneficiary receives the excess, if any, of his contributions, accumulated with interest to his retirement date, over the sum of the pension payments made to him. However, if his surviving spouse is entitled to a pension after his death, such excess will not be paid to his beneficiary. At the death of the surviving spouse, the excess, if any, of the contributions accumulated with interest to his retirement date over the sum of the pension payments made to him and his surviving spouse will be paid.

Section 6.1
Summary of Plan and Contribution Provisions, continued

A retired employee's beneficiary will receive a death benefit equal to the amount from the following schedule according to the employee's age and service at retirement:

Age	Service	Age + Service	Death Benefit
65	20	N/A	$8,000
60	N/A	90	$8,000
N/A	25	N/A	$8,000
N/A	N/A	94	$8,000
60-64	20	N/A	$6,000
55-59	20	N/A	$5,000
All Others			$2,000

Termination Benefits:

If an employee terminates his employment prior to eligibility for retirement or disability and after completing one year of service, he receives a refund of his contributions plus interest (3% after December 31, 1979). If he terminates after 90 days but prior to one year, he receives his contributions without interest, and if he terminates less than 90 days after hire, he receives no refund. If an employee has completed 10 years of continuous service and elects to leave his contributions in the Plan, he remains entitled to his normal retirement pension beginning at age 65 but based on his compensation and service at termination.

Optional Benefit Forms:

In lieu of a normal pension, an employee may elect an optional annuity of equivalent actuarial value providing payments of 1/2, 2/3, or all of his reduced pension to his spouse after his death (Option A).

Alternatively, an employee may elect an optional annuity of equivalent actuarial value providing payments of 1/2, 2/3, or all of his reduced pension to his spouse after his death with the further provision that his benefit will be restored to the full amount to him after the death of his spouse (Option B).

Retired Employees:

Benefits for retired employees have been valued according to benefits in effect at time of retirement as modified by subsequent amendments. Such benefits are kept on records maintained by the Authority.

Section 6.1
Summary of Plan and Contribution Provisions, continued

Voluntary Early Retirement Incentive Program:

During 1997, the Plan was amended to offer enhanced retirement benefits to all employees who have at least 25 years of continuous service on or before December 31, 1999, and who have not retired prior to January 1, 1997. Those eligible on or before June 30, 1997, had to elect to participate during the period March 1, 1997, to June 30, 1997. Employees eligible during the period July 1, 1997, to December 31, 1999, must elect to participate between July 1, 1997, and February 28, 1998. All eligible employees who elect to participate must retire no later than December 31, 1999. The benefit is determined based on a formula multiplier of 2.40% of average annual compensation with the benefit cap at 70.0% of such average annual compensation.

Ad hoc increases in retiree benefits:
As part of the Arbitration Award ruling of November 13, 2003, the following ad hoc increases were given to retirees in payment status as of January 1, 2000:

(a) $75 per month for members retired before January 1,1980
(b) $50 per month for members who retired on or after January 1, 1980, but before January 1, 1991
(c) $40 per month for members who retired on or after January 1, 1991, but before January 1, 2000

As part of an Arbitration Award ruling of June 26, 2007, another ad hoc adjustment was made for participants.

Contribution Requirements Under P.A. 95-0708

Beginning January 18, 2008, the Authority shall make contributions to the Plan in an amount equal to 12 percent of compensation and participating employees shall make contributions in an amount equal to six percent of compensation. For years through 2040, the amount paid by the Authority with respect to debt service on bonds issued for contribution to the Retirement Plan shall be treated as a credit against the amount of required contribution, up to an amount not to exceed six percent of compensation paid by the Authority in the following year.

If the funded ratio is projected to decline below 60 percent in any year before 2040 using reasonable actuarial assumptions and the projected unit credit funding method, the contribution shall be increased so that the funded ratio is not projected to drop below 60 percent. If the funded ratio drops below 60 percent in any year before 2040, the contribution shall be increased so that the funded ratio is projected to reach 60 percent within 10 years. The increase in contributions shall be effective as of the January 1 following the determination, or 30 days following the determination, whichever is later. One-third of the increase in contributions shall be paid by participating employees and two-thirds by the Authority.

Beginning in 2040, the minimum contribution for each fiscal year shall be predetermined each year as the amount required to bring the total assets of the Plan up to 90 percent of the total actuarial liabilities by the end of 2059, using the projected unit credit funding actuarial cost method and reasonable actuarial assumptions. Participating employees shall be responsible for one-third of the required contribution and the Authority shall be responsible for two-thirds of the required contribution.

Beginning in 2060, the minimum contribution for each year shall be an amount needed to maintain the total assets of the Plan at 90 percent of the total actuarial liabilities of the Plan and the contribution shall be funded one-third by participating employees and two-thirds by the Authority.

Section 6.2
Description of Actuarial Methods and Valuation Procedures

A. Actuarial Cost Method

Liabilities and contributions shown in this report are computed using the **Projected Unit Credit Cost Method** of funding.

Sometimes called a "funding method," this is a particular technique used by actuaries for establishing the amount and incidence of the annual actuarial cost of pension plan benefits, or normal cost, and the related unfunded actuarial accrued liability. Ordinarily the annual contribution to the plan is comprised of (1) the normal cost and (2) an amortization payment on the unfunded actuarial accrued liability.

Under the Projected Unit Credit Cost Method, the **Normal Cost** for the given year is computed as the present value of the unit of benefit attributable to that year for each active member. The Normal Cost for the Plan is determined by summing individual results for each active member.

The **Actuarial Accrued Liability** under this method at any point in time is equal to the present value of benefits accrued to the measurement date using a service pro-rate method.

The **Unfunded Actuarial Accrued Liability** is the excess of the Actuarial Accrued Liability over the Actuarial Value of Plan Assets actually on hand on the valuation date.

Under this method experience gains or losses, i.e., decreases or increases in accrued liabilities attributable to deviations in experience from the actuarial assumptions, adjust the Unfunded Actuarial Accrued Liability.

The **Funded Ratio** is the ratio of the actuarial value of assets to the Actuarial Accrued Liability.

B. Asset Valuation Method

The actuarial value of assets is based on a five-year smoothing method and is determined by spreading the effect of each year's investment return in excess of or below the expected return. The Fair Value of assets at the valuation date is reduced by the sum of the following:

1. 80% of the return to be spread during the first year preceding the valuation date,
2. 60% of the return to be spread during the second year preceding the valuation date,
3. 40% of the return to be spread during the third year preceding the valuation date,
4. 20% of the return to be spread during the fourth year preceding the valuation date

C. Valuation Procedures

No actuarial liability is included for members who terminated non-vested prior to the valuation date, except those due a refund of contributions.

The compensation amounts used in the projection of benefits and liabilities were January 1, 2023 rates of pay provided by staff of the Retirement Board of Trustees.

No termination or retirement benefits were projected to be greater than the dollar limitation required by the Internal Revenue Code Section 415 for governmental plans.

Annual increases in salary were limited to the dollar amount defined under Internal Revenue Code Section 401(a)(17) for affected members.

Section 6.3
Summary of Actuarial Assumptions and Changes in Assumptions

Rate of Covered Pay: The rate of covered pay for participants has been estimated at $659,594,235 for 2023. The following adjustments were made to the actual covered earnings for 2022 supplied by the Authority:

(a) No earnings or a fractional year of earnings were submitted for employees with a work status date in 2022 who were hired during 2021. We have annualized the 2022 earnings and assumed minimum earnings of $50,750 per year for this group.

(b) For employees on layoff, extended leave of absence, or inactive status, we have assumed minimum earnings of $50,750 per year.

(c) A one-time bonus payment attributed to employment during 2020 was removed from the 2022 actual earnings for the purpose of determining 2023 pay rates.

(d) For all employees, 2023 salary was assumed to increase 1.50% from 2022.

Retiree Benefits: The benefit amounts received for retirees were compared to information received from the Authority for the prior valuation.

Earnings on Plan Assets: 8.25% per annum, compounded annually, net of investment expenses.

Salary Inflation: 3.10% per annum

Compensation Increases: According to the following table, compounded annually, assumed end of year (includes inflation):

Years of Service	Rate
1	11.00%
2	12.00%
3	16.00%
4	8.00%
>=5	3.50%

Mortality:

(a) *Active Members & Healthy Retirees* — The SOA Public Mortality General Below Median generational with Improvement Scale MP-2018 with a 13% increase adjustment for female participants.

(b) *Survivors* — The SOA Public Survivor Mortality General Below Median generational with Improvement Scale MP-2018. Beneficiaries of current retirees are assumed to have the same mortality as active members & healthy retirees prior to the death of the member retiree.

(c) *Disabled Retirees* — The SOA Public Disability Mortality General Below Median generational with Improvement Scale MP-2018.

Section 6.3
Summary of Actuarial Assumptions and Changes in Assumptions, continued

Withdrawals from Service: According to the following table shown for illustrative ages:

Age	Rates of Termination for Reasons Other than Death or Disability
25	8.50%
30	7.00%
35	4.90%
40	3.80%
45	3.20%
50	2.70%
55 & Older	0.00%

If service is 25 or greater, no withdrawal is assumed.

Recovery from disability without returning to work: Disabled members are assumed to recover according to the following table as shown for illustrative ages:

Sample Attained Ages	Disabled Recovery [1]	
	Men	Women
30	3.419%	3.954%
35	2.899%	3.463%
40	2.215%	2.881%
45	1.392%	2.204%
50	0.549%	1.419%
55	0.029%	0.580%
60	0.000%	0.021%
65	0.000%	0.000%
70	0.000%	0.000%
75	0.000%	0.000%
80	0.000%	0.000%

1. Disability recovery after verification of the ability to return to work in the same position as determined by the Plan's Disability manager.

Disability Allowance: According to the following table as shown for illustrative ages:

Age	Rate of Disability
25	0.10%
30	0.10%
35	0.25%
40	0.50%
45	0.73%
50	0.85%
55	1.15%
60	1.25%
65 & older	1.25%

Service Retirements:

Age	Pre 1/19/2008 Hires Probability of Retirement		Post 1/18/2008 Hires Probability of Retirement	
	Service<25	Service>25	Service<25	Service>25
45-54	0.00%	20.00%	0.00%	0.00%
55	2.00%	20.00%	2.00%	2.00%
56	2.00%	20.00%	2.00%	2.00%
57	2.50%	20.00%	2.50%	2.50%
58	3.00%	20.00%	3.00%	3.00%
59	3.50%	25.00%	3.50%	3.50%
60	4.00%	25.00%	4.00%	4.00%
61	5.00%	35.00%	5.00%	5.00%
62	15.00%	35.00%	15.00%	15.00%
63	15.00%	35.00%	15.00%	15.00%
64	20.00%	35.00%	20.00%	20.00%
65	30.00%	40.00%	30.00%	30.00%
66	30.00%	30.00%	30.00%	30.00%
67	30.00%	30.00%	30.00%	30.00%
68	30.00%	30.00%	30.00%	30.00%
69	30.00%	30.00%	30.00%	30.00%
70-74	30.00%	30.00%	30.00%	30.00%
75	100.00%	100.00%	100.00%	100.00%

Spouse Data: 75% of employees eligible at retirement are assumed to be married, 40% of those married are assumed to elect a 50% J&S option (Option A or B–50%). Of those electing a 50% J&S, 75% are assumed to elect the pop up feature (Option B–50%) and the average equivalency factors to convert their accrued pension to a spouse option (Option A–50%) and (Option B-50%) are assumed to be 88% and 86%, respectively. A wife is assumed to be 3 years younger than her husband. Actual dependent coverage data was used for participants retired as of the valuation date.

Section 6.3
Summary of Actuarial Assumptions and Changes in Assumptions, continued

Miscellaneous and Technical Assumptions:

Pay Increase Timing:	End of (Fiscal) year.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service from date of participation is used to determine the amount of benefit payable.
Decrement Relativity:	Decrement rates are used directly based on assumptions, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability and turnover do not operate after 25 years of service.
Actuarial Math Contribution Expense Load:	Prior year expenses rounded to the nearest $100,000

Summary of changes since January 1, 2022 Valuation

There have been no changes from those used in the prior valuation.

Section 7 - ASOP 51

Actuarial Standard of Practice No. 51 Disclosures

Funding future retirement benefits prior to when those benefits become due involves assumptions regarding future economic and demographic experience. These assumptions are applied to calculate actuarial liabilities and the corresponding funded status of the Plan. However, to the extent future experience deviates from the assumptions used, variations will occur in these calculated values. These variations create risk to the Plan. Understanding the risks to the funding of the Plan is important. Actuarial Standard of Practice No. 51 (ASOP 51) requires certain disclosures of potential risks to the Plan and provides useful information for intended users of actuarial reports that determine Plan contributions or evaluate the adequacy of specified contribution levels to support benefit provisions. While this public pension plan is not subject to the funding provisions of ERISA, The Retirement Plan for Chicago Transit Authority Employees uses the information presented to assist in making contribution decisions.

Under ASOP 51, risk is defined as the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience.

It is important to note that not all risk is “negative”, but all risk should be understood and accepted based on knowledge, judgment and educated decisions. Future measurements may deviate in ways that produce “positive” or “negative” financial impacts to the Plan.

In the actuary’s professional judgment, the following risks may reasonably be anticipated to significantly affect the plan’s future financial condition.

- Investment risk – the risk that assets will not return as expected
- Interest rate risk – the risk that the general level of interest rates will increase or decrease significantly from current levels
- Contribution risk – the risk that the actual contribution made will be different than the actuarially determined contribution
- Asset liability mismatch - potential that changes in asset values are not matched by changes in the value of liabilities
- Longevity and other demographic risk – the risk that mortality or other demographic experience will be different from expected

The following information is provided to comply with ASOP 51 and furnish beneficial information on potential risks to the Plan. This list is not all-inclusive; it is an attempt to identify the most significant risks and how those risks might affect the results shown in this report.

Note that ASOP 51 does not require the actuary to evaluate the ability or willingness of the Plan sponsor to make contributions to the Plan. In addition, this valuation report in not intended to provide investment advice or to provide guidance on the management or reduction of risk. Buck welcomes the opportunity to assist in such matters as part of a separate project or projects utilizing the appropriate staff and resources for those objectives.

Section 7 - ASOP51, continued

Assessment of Risks

- Investment return - One type of investment risk is that assets materially underperform expected return.

    - Lower assets mean higher unfunded liability and larger contribution amounts. For example, if the trust earns 1% less than assumed each year for ten years, the projected fair value of assets would be approximately 10% lower than expected.
    - The five-year smoothing method used for the actuarial value of assets defers a portion of investment gain/loss in each of the previous five years. If the assumed return on assets consistently overestimates the actual return on assets, the actuarial value of assets will be consistently higher than the true market value. Consistent underestimation of the unfunded liability can prevent the Plan from achieving anticipated funding goals even when all minimum required contributions are made timely.

- Asset growth does not keep pace with liability increases over time - One type of investment risk is that asset returns do not keep pace with liability growth over time. Plan liabilities are based on the discounted present value of anticipated future benefit payments. That present value grows at the discount rate as time passes and the future payouts move closer. If investment returns are lower than the rates used to discount liabilities, plan liabilities will increase more rapidly than plan assets. Over extended periods of time, such as those involved in pension obligations, these discrepancies can accumulate to significant shortfalls.

- Market shocks or regime changes - Invested assets are subject to significant disruptions from market shocks, such as the financial crisis of 2008/2009, or as a result of systemic regime changes that persist for years, such as historically low interest rates over the recent decade.

- Liability duration versus asset duration: Unless assets are explicitly structured to mimic the characteristics of plan liabilities, there is a risk that economic scenarios that effect interest rates will have a larger impact on liability than on assets. This is because plan liability is the discounted value of benefit payments that extend way out into future years, i.e., have a long duration. Even relatively small changes in interest rates can have a significant impact on plan liability; a decline in interest rates increases liability, while a rise in interest rates decreases liability. Plan investments typically have a shorter duration with respect to interest rate changes, often holding fixed income securities with lower durations than plan liabilities, and typically maintaining some moneys in equity investments that are not as directly sensitive to interest rate changes.

  For this Plan, a 1% decline in the discount rate used to value funding liabilities (from 8.25% to 7.25%), would increase the Plan's liabilities by approximately 9.48%.

- Salary increases - Plan costs are sensitive to salary increases, with higher rates leading to higher obligations. This is because benefits at retirement are pay related, meaning that higher pay generates higher benefit levels at retirement. Compensation increases greater than assumed lead to actuarial losses since projected benefits are higher than predicted by assumed rates.

- Longevity and other demographic risks - Potential that mortality or other demographic experience (retirement, turnover, disability) may be different than expected. As the Plan matures and the majority of participants reach (or have reached) retirement eligibility, risks associated when participants retire can become significant. The Plan provides for unreduced early retirement benefits after meeting certain age and service conditions. These benefits are highly subsidized and thus can be significantly more valuable than normal retirement benefits and regular early retirement benefits. The demographic assumptions used to determine the actuarial valuation attempt to account for unreduced early retirement based on historical plan experience. However, due to the unpredictable nature of such benefits, future experience could differ significantly from past experience.

In addition to the risk that participants will not retire as expected, the Plan is subject to longevity risk the risk that participants will live longer (or shorter) than expected.

- Declining active workforce - since employer contributions are based on a percentage of participant's salaries, a declining active workforce will have the impact of the Plan potentially receiving lower contributions. In addition, if the required dollar amount of contributions remain level or increase, a declining active workforce will result in higher contribution rates in order to meet required contribution levels.

- Contribution risk – risk of not contributing an actuarially determined contribution. The Plan contribution is a statutory amount. There is a risk associated with the employer's contribution when the statutory amount and the actuarially determined contribution (Actuarial Math Contribution) amount differ. Actuarially determined contributions are calculated to adequately fund the Plan. Therefore, when the statutory contribution is lower than the actuarially determined contribution, there is an increased risk the Plan may not be sustainable in the long term.

Historical Results

The following table shows selected historical values of key valuation measures. These items illustrate how actual volatility has impacted the Plan in recent years and gives additional context to the risks described above. Further information can be found in the actuarial valuation reports for each year.

Valuation Date	1/1/2019	1/1/2020	1/1/2021	1/1/2022	1/1/2023
Actuarial Value of Assets (Billion)	1.84	1.88	1.96	2.06	2.08
Asset Return in Prior Year	-3.53%	15.70%	7.60%	17.60%	-8.88%
Investment gain/(loss) - AVA basis (Million)	(22.2)	(12.3)	(7.7)	29.9	(50.3)
Actuarial Accrued Liability (Billion)	3.49	3.58	3.67	3.74	3.83
Liability duration	9.48	9.50	9.66	9.58	9.48
The ratio of retired life* actuarial accrued liability to total actuarial accrued liability	67.4%	67.5%	68.0%	68.4%	69.7%
The ratio of cashflow to actuarial value of assets	-4.9%	-4.7%	-3.7%	-4.2%	-4.7%
The ratio of actuarial value of assets to participant payroll	294.7%	298.3%	300.8%	312.9%	314.7%
Normal cost (Million)	64.0	64.9	68.9	67.8	68.9
Discount rate	8.25%	8.25%	8.25%	8.25%	8.25%
Non-Investment gain/(loss) (Million)	(67.3)	(37.6)	(27.1)	(15.7)	(49.5)
Funding Policy contribution (Million)	112.3	130.4	134.2	135.7	136.2

* Retired members and beneficiaries

Commentary on Plan Maturity Measures

The ratio of retired life actuarial accrued liability to total actuarial accrued liability

A mature plan will often have a ratio above 60 - 65 percent. A higher percentage will generally indicate an increased need for asset / liability matching due to inability to absorb volatility in future returns.

The ratio of cashflow to actuarial value of assets

The cashflow as a percentage of assets means the fund may need to invest in more liquid assets to cover the benefit payments. More liquid assets may not garner the same returns as less liquid assets and therefore increase the investment risk. However, there may already be enough liquid assets to cover the benefit payments, less investment return is needed to cover the shortfall, or only a small portion of assets will need to be converted to cash. Therefore, the investment risk is likely not amplified at this time. This maturity measure should be monitored for continual negative trend with greater magnitude.

The ratio of actuarial value of assets to participant payroll

Plans that have higher asset-to-payroll ratios experience *more* volatile employer contributions (as a percentage of payroll) due to investment return. For example, if lower than expected asset return increases the unfunded liability of two plans by the same percent the plan with a higher assets-to-payroll ratio may experience higher contribution volatility than a plan with a lower asset-to-payroll ratio.

Glossary of Terms

Actuarial Accrued Liability	Total accumulated cost to fund pension benefits arising from service in all prior years.
Actuarial Cost Method	Technique used to assign or allocate, in a systematic and consistent manner, the expected cost of a pension plan for a group of plan members to the years of service that give rise to that cost.
Actuarial Present Value of Future Benefits	Amount which, together with future interest, is expected to be sufficient to pay all future benefits.
Actuarial Valuation	Study of probable amounts of future pension benefits and the contributions needed to fund those benefits.
Actuary	Person who performs mathematical calculations pertaining to pension and insurance benefits based on specific procedures and assumptions.
Normal Cost	That portion of the actuarial present value of benefits assigned to a particular year in respect to an individual participant or the plan as a whole.
Unfunded Actuarial Accrued Liability (UAAL)	The portion of the actuarial accrued liability not offset by plan assets.